



Mariners Weather Log

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Painting By Carl G. Evers

CARPATHIA *pauses to remember those who died in the sinking of
the TITANIC 15 April, 1912*

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U.S. Naval Institute

For more information see article, The Titanic, the Carpathia, and the Ice Patrol on page 4



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Hello once again from the wonderful world of VOS. I hope that these hot summer daze are treating y'all well. Remember—lots of fluids & remember your sunscreen....

This is yet another exciting issue of the Mariners Weather Log (MWL). The National Hurricane Center has finally been able to provide a very intense and information packed Tropical review. I am glad they found a bit of breathing room just before the next season really kicks in. To help cool everyone off a bit, the International Ice Patrol offers some refreshing stories about their inception and then improvements in 2006. Our resident historian Skip Gilham finds yet another fascinating story on the loss of the Vessel **Francisco Morazon**.

On a more official note, the AMVER SEAS Inmarsat address 31102030798481 was replaced with an updated Special SEAS address in 2003. Previous articles and information from your local Port meteorological officers told of the termination of the 3110 address in the future. As of May 21, 2006, the 3110 address is no longer active. If you are still trying to transmit your weather observations to the 3110 address, please contact your local PMO or myself for instructions of switching to the updated address. Please provide which type of Inmarsat you are using, as the instructions are unit specific.

On a personal note, the VOS Program and the MWL would like to wish a fond farewell to our Oakland PMO, Mr. Bob Novak. Bob retired from government service on 01 June and will be sorely missed. Fair winds friend—enjoy Yosemite...

Once again, I hope you enjoy this offering of the MWL and thanks for supporting the MWL and VOS program.

Regards—Luke ⚓

Some Important Web Page Addresses

NOAA	http://www.noaa.gov
National Weather Service	http://www.weather.gov
National Data Buoy Center	http://www.ndbc.noaa.gov
AMVER Program	http://www.amver.com
VOS Program	http://www.vos.noaa.gov
SEAS Program	http://seas.amverseas.noaa.gov/seas/seasmain.html
Mariners Weather Log	http://www.vos.noaa.gov/mwl.shtml
Marine Dissemination	http://www.nws.noaa.gov/om/marine/home.htm
U.S. Coast Guard	http://www.navcen.uscg.gov
Navigation Center	marcomms/

See these Web pages for further links.



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The Titanic, the Carpathia, and the Ice Patrol

LT William Woityra, Ice Information Officer, United States Coast Guard, International Ice Patrol

In the early morning hours of April 15th, 1912, the British Steamer **Carpathia** responded to the distress calls of the **HMS Titanic**, which was rapidly taking on water after striking an iceberg in the North Atlantic. At 1:45 AM, while still miles away, the **Carpathia** received the **Titanic's** final radio call "Engine room flooded up the boilers..." followed by silence. The **Titanic** would succumb to the icy waters some 35 minutes later. The **Carpathia's** normal top speed was 14 knots, although

on that fateful night the crew had worked the speed up over 17.5 knots due to the urgency of **Titanic's** calls. **Carpathia's** crew sighted green flares ahead at 2:30, and arrived on scene at 3:35, but the great ship was nowhere to be seen. At just past 4:00 AM, the **Carpathia's** crewmen located and brought aboard the first survivors. Dawn's light would reveal a rag-tag collection of lifeboats strewn amid the field of ice. By midmorning all survivors were drawn from the icy waters and given shelter aboard

Carpathia. By final tally, only 705 of the **Titanic's** original 2,227 crew and passengers made it aboard the rescue ship alive.

After searching widely (and in vain) for the remainder of the morning, the **Carpathia** was still on scene hours later when the **Californian** arrived. Captain Rostron of the **Carpathia** made one final circle and turned east to deliver the survivors to New York, leaving the **Californian** to recover the remaining wreckage.



Painting By Carl G. Evers

CARPATHIA pauses to remember those who died in the sinking of the **TITANIC** 15 April, 1912

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Ice Patrol

Four days prior, the **Carpathia** had departed New York, enroute Liverpool, on what they surely thought would be an uneventful voyage. Now, with some 700 additional passengers, they were turned and bound for New York, again. Carefully navigating the ice field, and fog that obstructed their path they would arrive in New York some three days later, arriving at 9:30 AM at Pier 54. More than 10,000 had gathered to watch in sorrow and shock as the **Carpathia** docked that morning in the heavy rain and thunder. The mood was mixed, as those present were torn whether to mourn those who did not return or to rejoice for those who had.

Since 1913, the US Coast Guard has

monitored the iceberg danger on the Grand Banks of Newfoundland and notified mariners of the hazardous bergs that would otherwise interfere with safe navigation. The International Ice Patrol, a Coast Guard unit stationed in Groton, Connecticut, is currently responsible for the mission. Fourteen active duty personnel and two civilians monitor the iceberg danger in the 500-thousand square miles of ocean where icebergs might be found.

The Ice Patrol relies heavily on the support of merchant traffic transiting through the operational area, both for reports of icebergs and sea surface temperatures (SST), to aid in iceberg melt and deterioration predictions. In

2005, the Ice Patrol initiated a program to recognize the ship that made the most contributions through SST or iceberg reports. Named after the **Carpathia**, which came to the aid of the victims of the **Titanic**, the Carpathia award is presented annually to the ship that makes the most information reports. In 2005, the **M/V Mattea**, home ported in Arnold's Cove Station, Newfoundland was the recipient, with 92 reports of SST and ice.

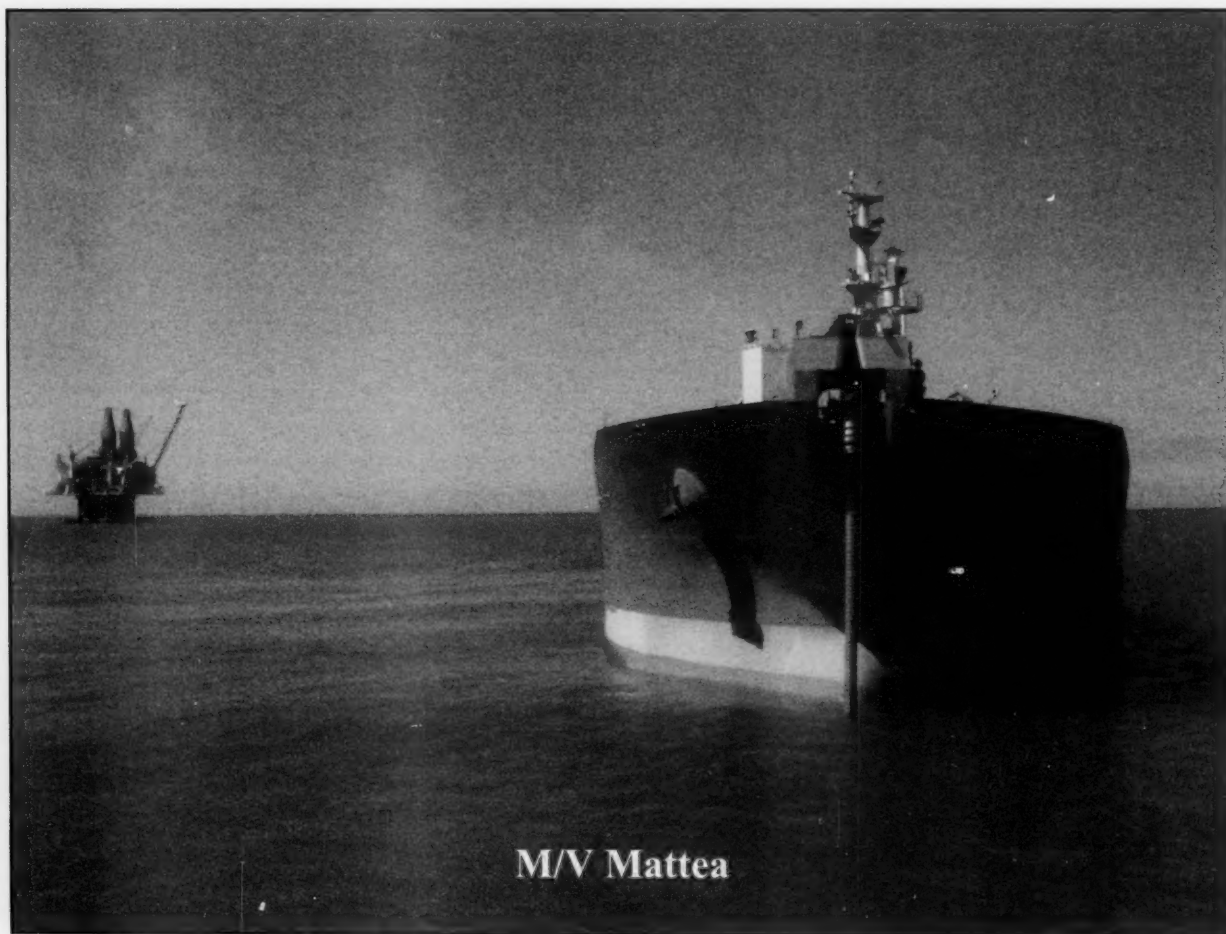
On January 31st, 2006, CDR Michael Hicks, Commander of the Ice Patrol, visited the **Mattea** at her home port to present the master and crew with a plaque and letter of appreciation.



On January 31st, 2006, CDR Michael Hicks (center), Commander of the Ice Patrol, visited the **Mattea** at her home port to present the master and crew with a plaque and letter of appreciation. Receiving the award are Bjorn Bogenes (left), President CanShip Ugland, LTD and Reg Mullett (right), Captain M/T **Mattea**.



Winners will also be recognized on a permanent plaque at the Ice Patrol offices in Groton. Thank you and congratulations to the **Mattea**, and thank you to all other mariners who made reports in 2005 and thus far in 2006. We look forward to working with you in the future and hope to see your vessel's name permanently enshrined on our "wall of fame."



M/V Mattea

Reference material for the article: Eaton, John P. and Haas, Charles A., Titanic: Triumph and Tragedy, W. W. Norton & Company; April 1995.



International Ice Patrol Improvements 2006

LT William Woityra, Ice Information Officer, United States Coast Guard, International Ice Patrol

The International Ice Patrol (IIP), a U.S. Coast Guard unit stationed in Groton, CT, has monitored iceberg danger on the Grand Banks of Newfoundland since 1913 as a result of the TITANIC disaster. Despite being staffed by only 16 personnel (14 active duty personnel and two civilians), the Ice Patrol routinely patrols and guards the 500-thousand square miles of the North Atlantic where icebergs threaten transatlantic shipping.

Ice Patrol personnel are constantly striving to make improvements to products and services that will aid in the achievement of the vision to: "Eliminate the Risk of Iceberg Collision," while embracing their Core Values of *Partnerships Built on the Spirit of International Cooperation, Individual Commitment to the Ice Patrol Mission, and Continuous Improvement through the use of Technology*.

In 2006, the Ice Patrol took action on several items to make the watch more efficient and the product deliverables more accurate and usable. The first and most significant of these was the enhancement of a longstanding partnership with the Canadian Ice Service (CIS).

Starting with the 2006 ice season, the Ice Patrol shared a single, unified iceberg database for the entire North Atlantic with the Canadian Ice Service. Only made possible recently

through the use of technology, the synchronized database marks a huge step forward for two partners, as it eliminates the need for bergs to be "handed off" as they crossed from one area of responsibility to another. Additionally, this shared database has the added benefit of fulfilling a major requirement for contingency planning – in the event of a catastrophic event or natural disaster at either the CIS or IIP offices, the iceberg information would be preserved, and notices could still be distributed to mariners. In conjunction with this synchronization, IIP and CIS now share all environmental data and utilize the same ocean current model which drives the iceberg drift and deterioration. Leveraging available technology, the ocean current model is now updated daily to reflect on scene oceanographic conditions, a major step up from the weekly updates that were used previously.

As a supplemental contingency measure, the Ice Patrol also established an off-site remote operations center at the Coast Guard Academy in New London, CT, from which the ice watch can be maintained in the event of an emergency at the normal IIP offices.

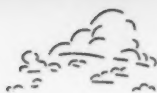
Furthermore, historical research at Ice Patrol showed that while the line demarking the Limit of All Known Ice (LAKI) was being updated twice a day, the 00Z LAKI was identical, or nearly identical, to the 12Z LAKI over 95% of the time. For this reason

Ice Patrol chose to generate a single LAKI each day, which would take into account the best information available and remain valid for 24 hours. This change should eliminate confusion over whether a given LAKI is the most up to date.

An additional change to the IIP product suite this year included a visual overhaul of our graphical iceberg chart with emphasis on accuracy and readability. The layout now more closely resembles the Canadian iceberg chart, while remaining visually distinct, thus making it more convenient and easier to use for mariners who employ both the U.S. and Canadian ice products.

Lastly, IIP's aerial iceberg reconnaissance efforts continue to benefit from advancing technology, as all flights are now equipped with Automatic Identification System (AIS) receivers that help the ice observers make the critical distinction between a berg and a boat—often nearly impossible from a radar image alone.

These changes, and many other smaller efforts, mark the Ice Patrol's commitment to promoting safe navigation in the North Atlantic. IIP welcomes feedback and suggestions from mariners who use our products. Please feel free to contact us if there is any way we can better serve you. Comments, questions and suggestions can be sent to iipcomms@uscg.mil or (860) 441-2626.



Shipwreck: *Francisco Morazon*

by Skip Gilham, Vineland, Ontario, Canada

By the time the St. Lawrence Seaway opened in 1959 the **Francisco Morazon** was an old ship. It had been built in 1922 and had sailed under seven previous names, serving throughout World War II as a German and then as a British flag freighter.

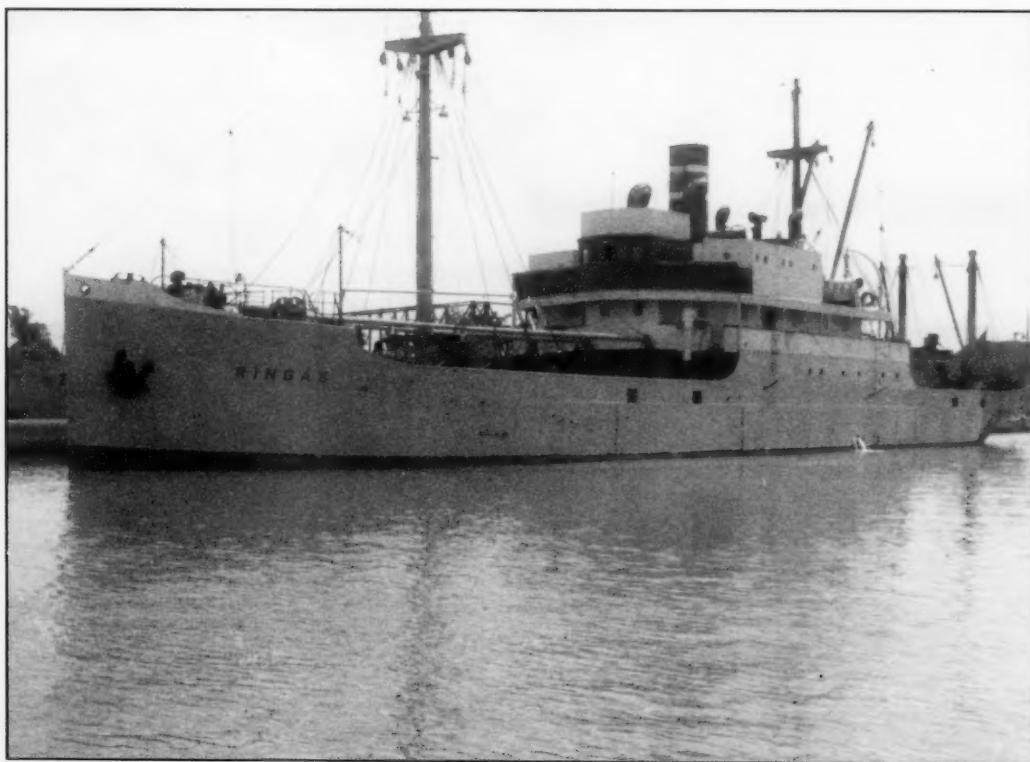
The vessel was constructed by Deutsche-Werft at Hamburg, Germany, in 1922 and it went to work for the well-known Hamburg-America Line as **Arcadia**. The 246-ft, 9-in long by 36-ft, 10-in wide vessel provided fast service for that era and was particularly efficient working in shallow draft harbors.

The ship was renamed **Elbing** in 1934 and re-powered the next year with a 4-cylinder steam turbine engine. It was on the Nazi side in the early years of the World War II but was confiscated by the British as a war prize in 1945 and operated for the British War Ministry as **Empire Congress**.

Once peace was established, the British assigned this ship to an allied firm that had suffered many war losses. The 1,442 gross-ton freighter joined Kr. Jebsen of Norway and resumed sailing as **Brunes**. This was changed to **Skuld** in 1947 and **Ringas** by Ekerholts Rederi A/S of Norway in 1948.

For the thirty years prior to 1952, this vessel had traded on deep sea routes, but **Ringas** came to the Great Lakes that year delivering china clay to Muskegon, Michigan. The vessel is shown in the Welland Canal.

Ringas returned the next year with pulpwood and general cargo and made a stop at Port Huron, MI. It was back on the Great Lakes in 1956 and returned again as **Los Mayas** in 1958. By now the ship was owned by Moa Navigation S.A. and was registered in Panama. **Los Mayas** hit bottom during a return visit to Muskegon in 1958 and began to leak. A cement patch was required to allow the ship to continue its voyage.



The Francisco Morazon as the Vessel Ringas (1953)



In 1959, the ship moved under the management of Inter-American Marine Operators of New York, and it was registered in Liberia as **Francisco Morazon**. Now registered at 1,407 gross tons, the ship headed through the newly opened St. Lawrence Seaway in 1959 for the Canadian Lakehead ports of Port Arthur and Fort William (now known as Thunder Bay).

Francisco Morazon's last trip included a stop at Toronto to unload phosphate late in 1960 and then on to Chicago to load 1,118.5 tons of freight for Hamburg and Rotterdam. This latter payload consisted of hides, canned chicken, lard, scrap metal, phosphate, gilsonite, tinplate, aluminum, solder dross, machinery, chemicals, castings, bottle caps, toys and baled hair. The shipment was valued at \$300,000.

The ship set out for the sea during the overnight hours of November 27, 1960. Onboard was the Greek

Captain, his wife, and 14 crew members who represented four nationalities.

Francisco Morazon encountered fog on Lake Michigan, and speed was reduced on the northerly journey. Calculating the distance traveled in these conditions was not easy, and the Captain mistook his ship's position. A problem with the feed pump required a stop for repairs, and now the race to exit the Great Lakes before the system closed on December 3 became a concern.

A storm on November 28 pounded the aging freighter, but they pushed on and were soon off course. Thick snow made matters worse and visibility was near zero. Off course and unable to see, the **Francisco Morazon** landed on the rocks 300 yards off South Manitou Island at 6:35 p.m. on November 29. Efforts to refloat the wounded freighter were not successful, and the storm drove the hull closer to shore.

Help arrived from the United States Coast Guard with the **Sundew** and **Mesquite** dispatched to the scene. Ten to twelve foot waves battered the shore; the Captain's wife, two months pregnant, was airlifted to the **USCG Mackinaw**.

There was no let up in the storm and several leaks developed due to holes and cracks, and, on December 4, the crew was removed.

Efforts to refloat the ship failed, and, in time, some of the cargo was salvaged. The hull has been pounded by subsequent storms and suffered from vandal fires. Today it bears little resemblance to the freighter that stranded 46 years ago this fall.



Coast Guard Icebreaker Mackinaw used in rescue operations for the Francisco Morazon.

*Image courtesy of the US Coast Guard Historic Photo Gallery.
http://www.uscg.mil/hq/g-cp/history/Icebreaker_Photo_Index_1.html*



Barometric Trace—Tropical Storm Alberto

Sealand Florida (KHRX) June 2006

KRHX 15063	99428	70631	41291	91604	10161	20153	40129	57030	74544	89///	22264	00126	2///	3///
KRHX 15094	99425	70644	41/92	/1219	10160	2015/	40050	57080	76364	8///	22254	00125	20201	3///
KRHX 15124	99423	70656	41396	80844	10139	20139	49900	57150	76366	887//	22264	00105	21410	3///
KRHX 15154	99417	70667	41393	83660	10139	20129	49780	56100	78084	887//	22254	00106	21612	3///
KRHX 15183	99418	70668	41/94	93427	10130	2012/	40011	52210	75054	89///	22214	00106	20205	300//
KRHX 16004	99414	70673	41398	52818	10139	20120	40100	52060	70222	83731	22254	00113	20604	303//

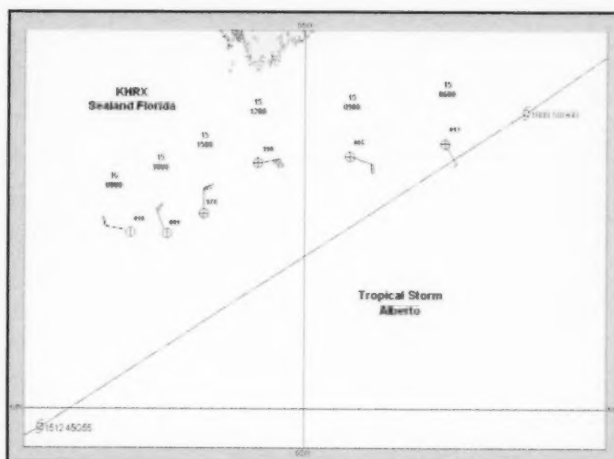
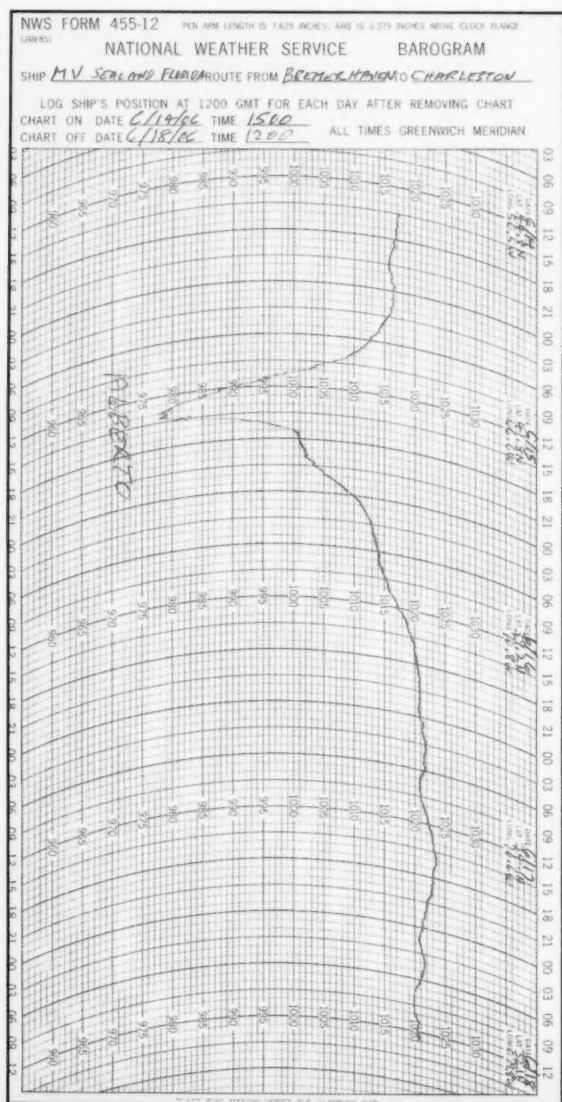


Image on the left is a Barograph trace from the Sealand Florida (KHRX) as she was coming over the top of Tropical Storm Alberto.



From The PMO Desk: Retirement of Bob Novak, PMO Oakland California

Robert Luke, Editorial Supervisor, Mariners Weather Log

Normally, these pages are reserved for stories, anecdotes, or just interesting facts that have been occurring with our Port Meteorological Officers (PMOs). I usually ask (OK coerce) one of the PMOs to submit something worthy enough to share with the VOS family. This time, I took it upon myself as Editor to usurp their section for a much greater task. I need to say thanks and farewell to our Oakland PMO. Mr. Bob Novak retired on June 01 after 46 years of government service. WOW! After sacrificing for 20 years in the Navy, Bob joined the National Weather Service in 1979. After a relaxing four-year tour on Johnson Island then six more in Colorado Springs, CO; Bob became the Oakland PMO.

Since 1989, Bob has been the PMO at Oakland, California. During his career, he was a part of many changes to the organization. The dramatic improvement in the ability to provide timely forecasts, warnings, and advisories is directly related to dedicated employees such as Bob.



Bob explains his gimbaled chronograph to the crowd.



Ms. Elizabeth Morse, Meteorologist in Charge, National Weather Service Forecast Office Sacramento presents the VOS retirement plaque to Mr. Bob Novak.

Unlike many professions where the bottom line is measured in dollars, the success of the National Weather Service is measured in far more important units: human lives and property. Lives have been saved and disasters averted because dedicated individuals like Bob have served using their full energy, talents, and abilities. Bob's contributions, particularly in the areas of recruiting and sustaining ships into the Voluntary Observation Program have been greatly appreciated, as observations are the building block of our forecast and warning program.

Again, I would like to express my sincere gratitude for a job well done. I wish you all the best in your retirement years.

Thank you for your guidance, corporate wisdom, and humor friend—Fair Winds and enjoy Yosemite.

Warmest regards,

Luke



Marine Weather Review—North Atlantic Area January through April 2006

By George P. Bancroft, NOAA National Center for Environmental Prediction

Introduction

This period covers the stormy mid-winter to early spring period, which featured 19 low-pressure systems developing hurricane-force winds, all of them occurring in the months of January through March. The most active period came late in February and in early March, when strong blocking in the eastern Atlantic concentrated strong cyclonic activity over the western North Atlantic. Due to frequent blocking in the eastern Atlantic or at high latitudes, only one hurricane-force storm passed near western Europe early in January. There was no tropical activity during this period, which is well outside the hurricane season, although tropical

cyclones have been known to occur in the past on rare occasions.

Significant Events of the Period

Northeast Atlantic Storm of January 9–11: This system was the stronger of two hurricane-force lows that developed in close succession over the northern Atlantic waters. The development of the first is shown in *Figure 1* as a frontal wave of low pressure that rapidly intensified to become the 947 hPa (27.96 in) hurricane-force low passing between Great Britain and Iceland by early on the 11th. This was the deepest low of the period (in terms of central pressure)

not only in the North Atlantic but for both oceans. The central pressure dropped an impressive 54 hPa in the twenty-four hour period ending at 1800 UTC January 10, a rate of more than 2 hPa per hour, and the highest deepening rate for any cyclone during this four-month period in both oceans. The cyclone produced hurricane-force winds from north of the British Isles to the Norwegian Sea from late on the 10th to the 11th as the storm passed north through the area, as revealed by the winds to 75 kts appearing on the quikscat image of *Figure 2*. The cyclone appears with a well-formed cloud spiral in the infrared satellite image of the storm near maximum intensity (*Figure 3*). The buoy 64046

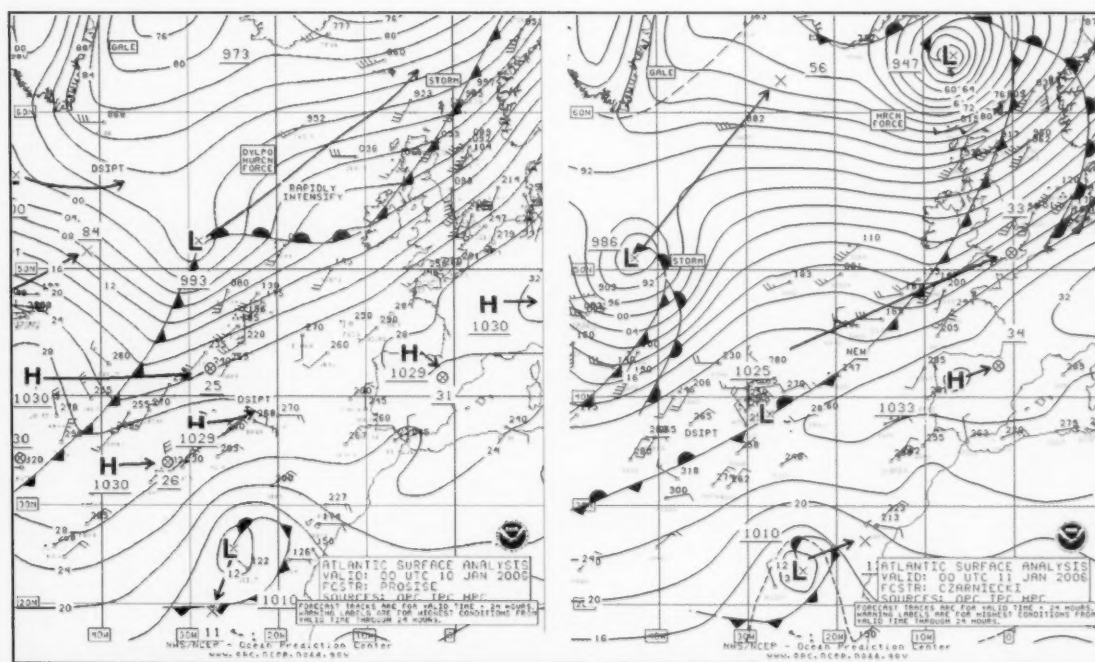


Figure 1. OPC North Atlantic Surface Analysis charts (Part 1 - east) valid 0000 UTC January 10 and 11, 2006, showing development of a hurricane-force storm, the most intense of the period.

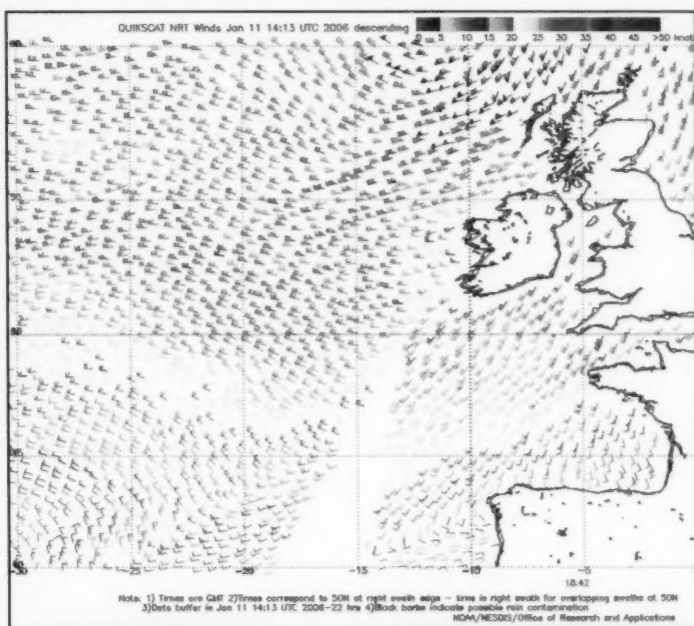


Figure 2. QuikScat scatterometer image of satellite-sensed winds on the south side of the storm shown in *Figure 1*, valid at 1842 UTC January 10, 2006. The resolution of the image is 25 km. The valid time of the pass is about five hours prior to the valid time of the second part of *Figure 1*.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.

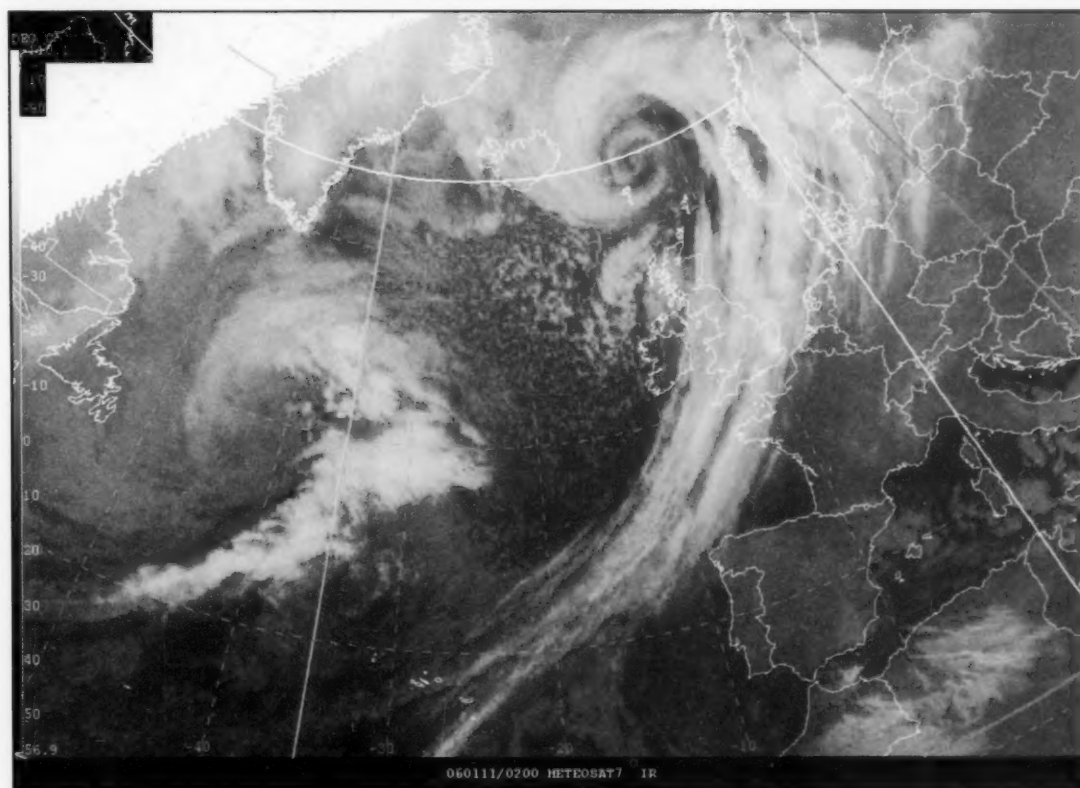


Figure 3. METEOSAT7 infrared satellite image valid at 0200 UTC January 11, 2006, showing the storm in *Figure 1* near maximum intensity. Satellite senses temperature on a scale from black (warm) to white (cold) in this type of imagery. The valid time is only two hours later than the valid time of the second part of *Figure 1*.



(60.6N 4.9W) reported southwest winds of 55 kts and 8.5 m seas (28 ft) at 2300 UTC on the 10th, and significant wave heights at this buoy peaked at 11.0 m (36 ft) three hours later. Among ships, **Vigilant** (GCML) (60.6N 1W) reported the strongest wind, 55 kts from the southwest, at 0000 UTC on the 11th. The vessel **Petrojarl Foinaven** (C6NR7) (60N 4W) reported west winds of 35 kts and 9.5 m seas (31 ft) twelve hours later. The storm exited the area on the 11th and was the only system to produce hurricane-force winds in this part of the Atlantic during the period.

North Atlantic Storm, January

10–12: This developing low passed across the Canadian Maritime Provinces late on January 9 and on the 10th, becoming a storm east of the island of Newfoundland late on the 10th. The initial development into a storm is shown in the second part of **Figure 1**, with further significant strengthening occurring as it headed northeast toward Iceland, on a track west of its predecessor. The lowest central pressure was 954 hPa as the center approached Iceland late on the 11th. A quikscat pass at 0747 UTC on the 11th had an appearance similar to **Figure 2** for the previous storm, with winds almost as strong, up to 70 kts. Ship data was sparse, with the strongest winds reported at the Grand Banks oil platforms. **Platform VEP717** (46.7N 48.7W) reported northwest winds of 56 kts at 0000 UTC January 11. The ship **OOCL Fortune** (VRWF2) (43N 43W) encountered west winds of 45 kts at 0600 UTC on the 11th. Twelve hours later, the **Nedlloyd Auckland** (PDHW) reported west winds of 35 kts and 10.0 m seas (32 ft). The storm then passed north of Iceland on the 12th.

North Atlantic Storms, January

13–19: Two storms traversed the area on a southwest to northeast track during this period. The first passed east of the island of Newfoundland early on the 13th, with **Platform VEP717** (46.7N 48.7W) reporting a southwest wind of 60 kts at 0600 UTC on the 13th. The cyclone developed a central pressure of 960 hPa near 53N 32W at 0000 UTC on the 14th, when the ship **Atlantic Cartier** (SCKB) encountered northwest winds of 60 kts near 50N 39W. The system briefly developed hurricane-force winds when passing 300 nmi south of Iceland at 0000 UTC on the 15th, before passing northeast of Iceland later that day. The second low moved from the New England coast on the 15th and passed across the Canadian Maritimes on the 16th, before redeveloping northeast of Newfoundland on the 17th. The system briefly developed hurricane-force winds while passing south of Greenland late on January 17, as revealed in a quikscat pass for 2039 UTC on the 17th. Winds reached 65 kts from the north near the southern tip of Greenland at that time. The central pressure reached 961 hPa near 62N 34W early on the 18th, before the system began to weaken, and move past Iceland early on January 20.

Northwest Atlantic Storm, January

22–24: This developing low tracked from New Brunswick northeast into the North Atlantic near 54N 47W in the 36-hour period ending at 1200 UTC January 23 (**Figure 4**) and developed hurricane-force winds late on the 22nd. The lowest central pressure of 952 hPa made this storm the second deepest of the period in the North Atlantic. **Platform VEP717** reported winds above 60 kts over the twenty-one hour period ending at

0900 UTC January 23, peaking at 71 kts (sustained) from the west at 0000 UTC on the 23rd. **Hibernia Platform** (HP6038 46.4N 48.4W) reported southwest winds of 60 kts at 1800 UTC on the 22nd. Buoy 44251 (44.5N 53.3W) reported a west wind of 47 kts with gusts to 62 kts and 7.0 m seas (23 ft) at 1500 UTC January 22. Buoy 44138 (44.3N 53.6W) reported northwest winds of 39 kts with gusts to 51 kts at 2300 UTC on the 22nd, and seas up to 9.5 m (31 ft) one hour later. The ship **Leonid Galchenko** (UCTK) (47N 47W) encountered west winds of 55 kts at 0000 UTC January 23. The cyclone subsequently turned north toward Greenland while maintaining hurricane-force winds through 0000 UTC on the 24th, before weakening, and then dissipating near the southern tip of Greenland on January 25.

North Atlantic Storm, January

26–29: A storm developed southeast of Nova Scotia late on January 25, passed east of the island of Newfoundland late on the 26th and then redeveloped southeast to a new center near 46N 39W early on the 28th. The system turned north and briefly developed hurricane-force winds at 1200 UTC on the 29th while passing 60N 37W with a central pressure down to 962 hPa. The cyclone then weakened to a gale while passing east of Greenland by the 30th.

Coastal Storm of January 31 to

February 3: A complex area of low pressure moved off the U.S. mid-Atlantic coast early on the 31st and quickly consolidated into a hurricane-force low by 0000 UTC February 1. **Figure 5** captures the initial rapid development of this storm, with the central pressure dropping 27 hPa in twenty-four hours, an impressive rate of intensification for that latitude. The

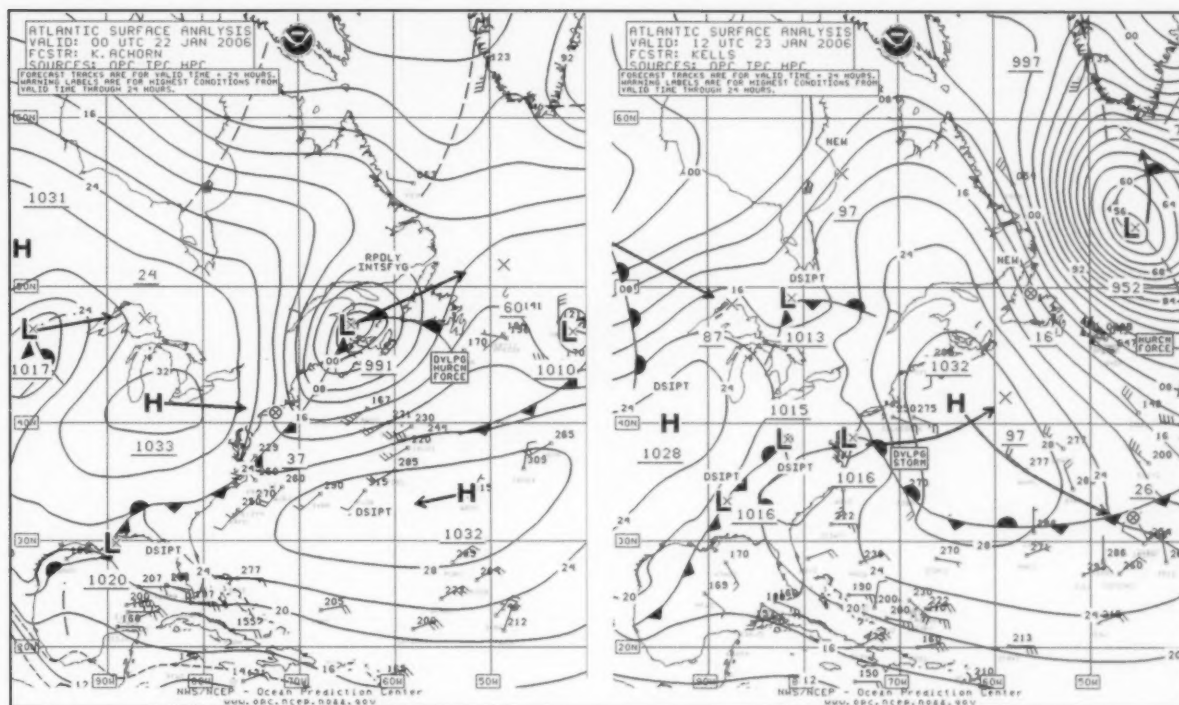


Figure 4. OPC North Atlantic Surface Analysis charts (Part 2 - west) valid 0000 UTC January 22 and 1200 UTC January 23, 2006.

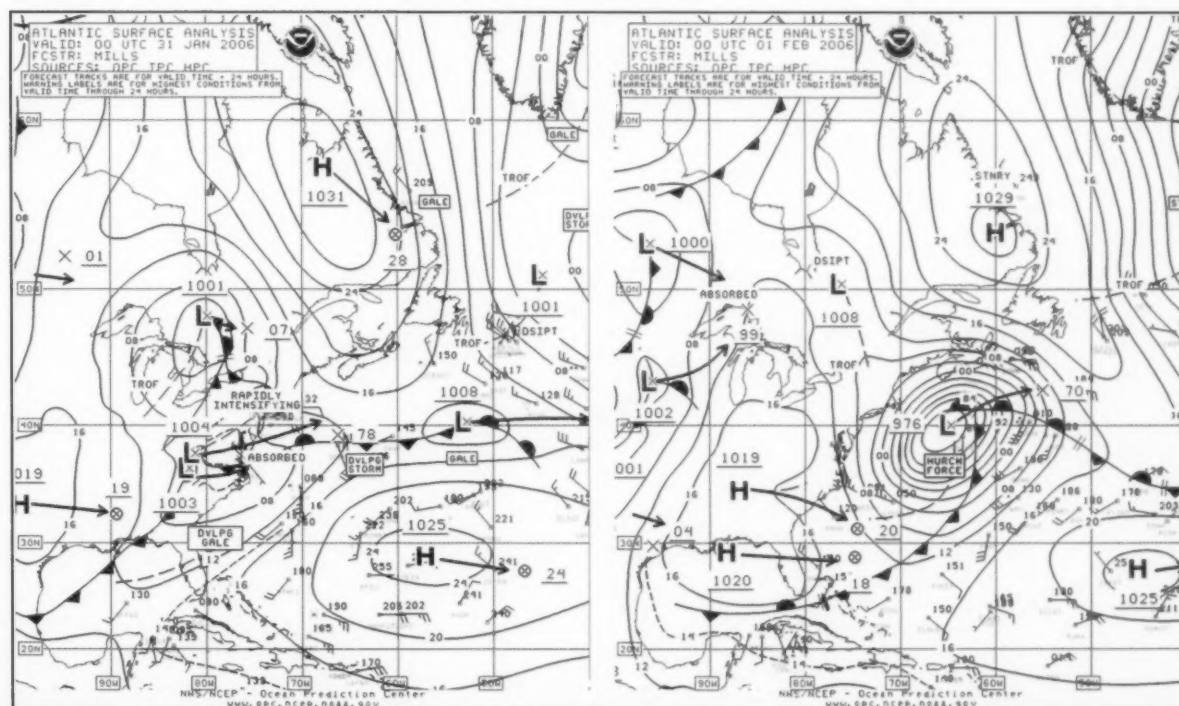


Figure 5. OPC North Atlantic Surface Analysis charts (Part 2) valid 0000 UTC January 31 and 0000 UTC February 1, 2006.



high-resolution quikscat data in **Figure 6** reveals winds to 70 kts west and southwest of the departing storm. The **Maersk Dexter** (ZIZP9) (39N 60W) reported a southwest wind of 50 kts and 10.5 m seas (35 ft) at 0600 UTC February 1. Six hours later the vessel **DMRG** (44N 62W) reported northeast winds of 55 kts and 12.0 m seas (39 ft). The vessel **Sealand Motivator** (WAAH) (43N 64W) encountered northwest winds of 55 kts and 15.0 m seas (49 ft) six hours later at 1800 UTC on the 1st. The buoy 44137 (42.3N 62.0W) reported northwest winds of 39 kts three hours later. Seas reached 10.0 m (32 ft) at buoy 44024 (42.3N 65.9W) at 1600 UTC on the 1st. The system then passed over the Grand Banks early on

February 2 and began to weaken, with **Platform VEP717** (46.7N 48.7W) reporting northwest winds of 60 kts at 0000 UTC on the 3rd. The cyclone subsequently dissipated over the central Atlantic waters early on February 5.

North Atlantic Storm, February 10–14: This powerful system developed from a frontal wave of low pressure 450 nmi south of the island of Newfoundland late on February 9.

Figure 7 shows the period of most rapid intensification of this low, with the central pressure dropping 36 hPa in a twenty-four hour period. Hurricane-force winds affected the Grand Banks platforms following passage of this storm. **Hibernia**

Platform (HP6038 at 46.4N 48.4W) reported a peak sustained west wind of 76 kts at 0900 UTC on the 11th, while **Platform VEP717** (46.7N 48.7W) reported west winds at 72 kts and **GSF Grand Banks** (YJUF7) (46.7N 48.0W) west winds of 69 kts at that time. A ship with the generic call sign SHIP (49N 47W) encountered west winds of 60 kts and 12.0 m seas (39 ft) a bit later at 1800 UTC that day. The storm center attained a maximum intensity of 953 hPa near 52N 41W at 0000 UTC on the 12th. The system maintained hurricane-force winds for at least 24 hours before the cyclone continued on a northeast track with gradual weakening after 0000 UTC on the 12th.

Coastal Storm, February 12–16: The second part of **Figure 7** shows the initial development of a frontal low-pressure wave over Georgia, with rapid intensification into a storm near the New Jersey coast twenty-four hours later as shown in **Figure 8**. A quikscat pass revealed winds to 60 kts south of the center about six hours later. The system moved rapidly northeast, passing east of Labrador late on the 13th. Again there were hurricane-force winds at the Grand Banks platforms, with **Platform VEP717** (46.7N 48.7W) reporting southwest winds of 70 kts and **Hibernia** (HP6038 at 46.4N 48.4W) southwest 65 kts along with 7.5 m seas (24 ft) at 0000 UTC on the 14th.

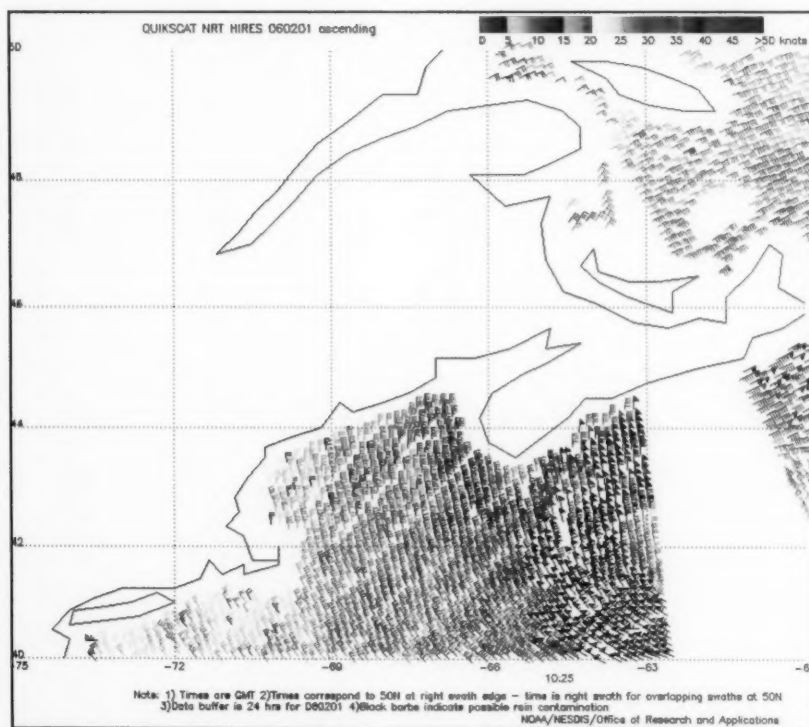


Figure 6. High-resolution QuikScat scatterometer image of satellite-sensed winds around the west side of the storm shown in **Figure 5**. The resolution is 12.5 km, versus 25 km in the coarser version of such imagery. The valid time of the pass is 1025 UTC February 1, 2006, or about ten and one-half hours later than the valid time of the second part of **Figure 5**.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.

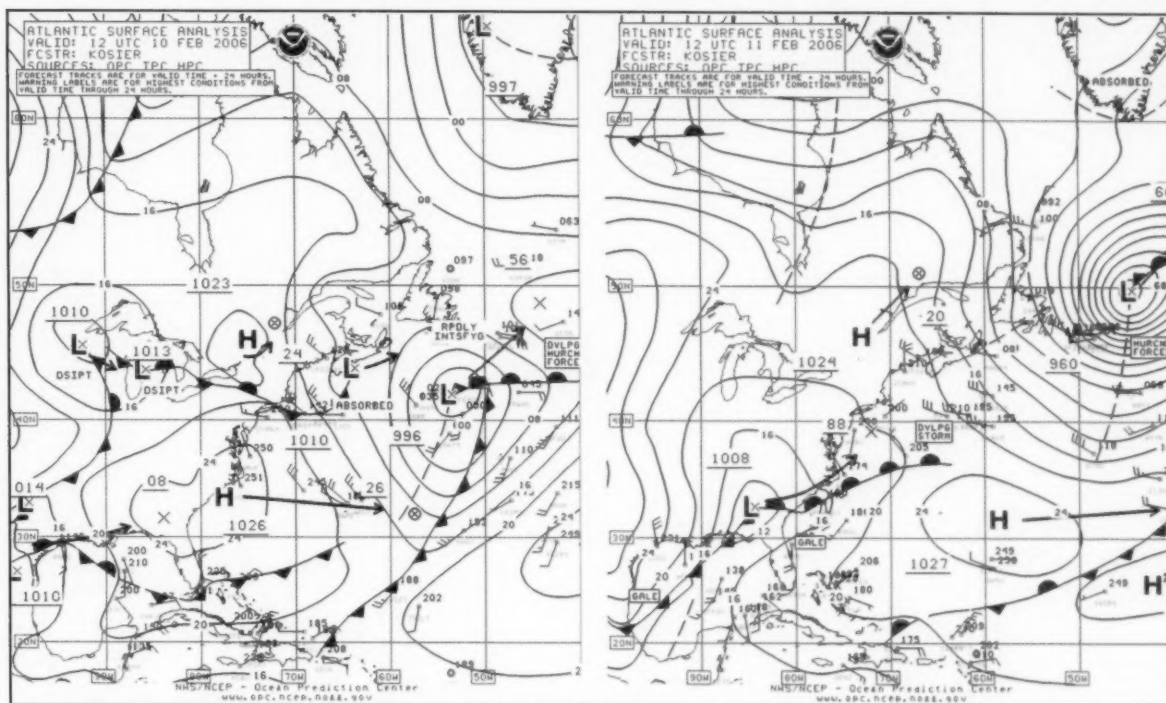


Figure 7. OPC North Atlantic Surface Analysis charts (Part 2) valid 1200 UTC February 10 and 11, 2006.

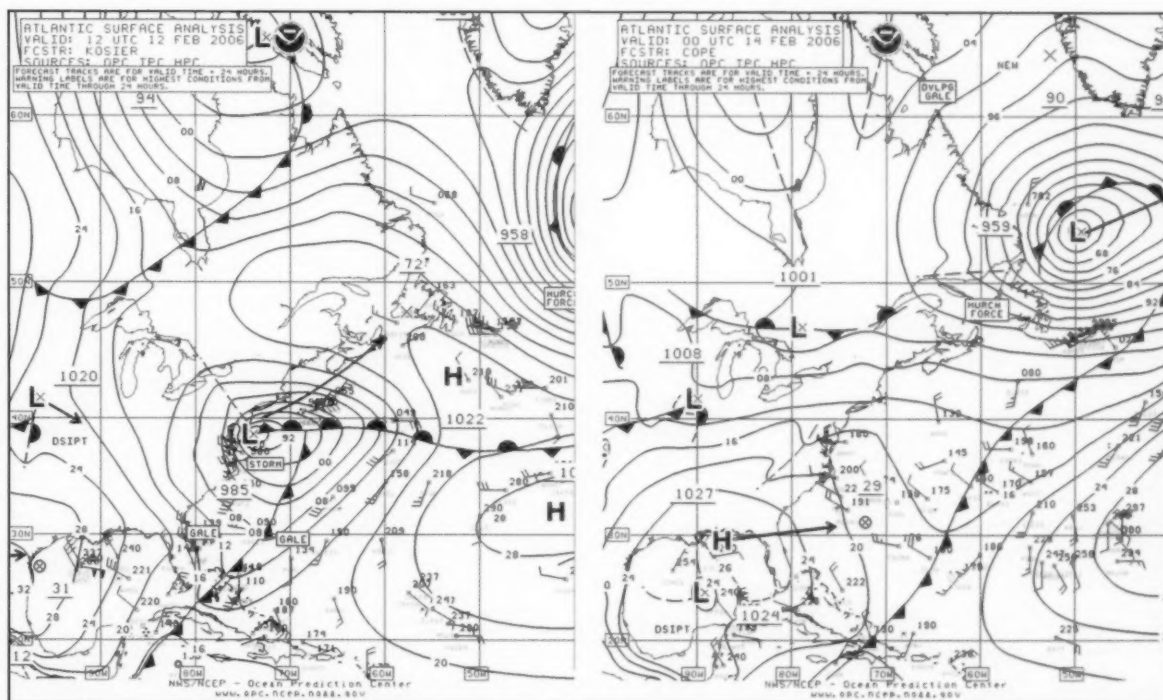


Figure 8. OPC North Atlantic Surface Analysis charts (Part 2) valid 1200 UTC February 12 and 0000 UTC February 14, 2006.



The high-resolution quikscat image in **Figure 9** shows winds to 60 kts east of the platforms and northeast winds up to 75 kts, where the flow ahead of an approaching frontal system encounters the southern tip of Greenland. The storm subsequently began a slow weakening trend while heading northeast, becoming a large storm over the northeast Atlantic early on the 16th and then weakening to a gale while passing northwest of Great Britain later that day.

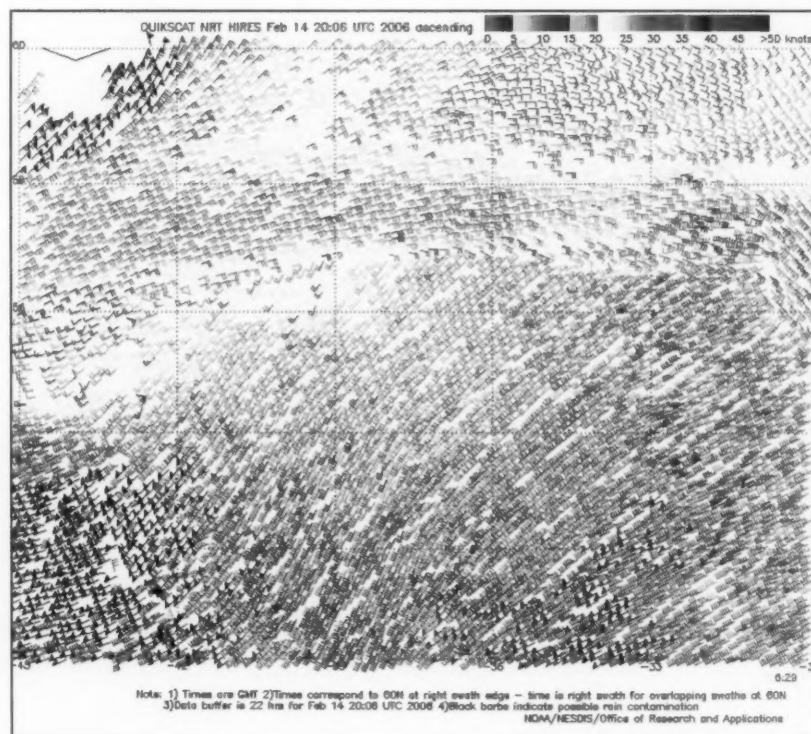
Western North Atlantic Storms of February 22 to March 1: A very active blocked pattern prevailed during this period, leading to several storms developing south of the Canadian Maritimes and turning north

across the Grand Banks before being forced west by a strong blocking high to the north and east. The cyclones all developed hurricane-force winds. The first developed from a frontal wave southeast of Newfoundland late on February 21, then moved to the Grand Banks late on the 22nd before turning northwest. The first part of **Figure 10** shows the motion of this storm northwest through the Labrador Sea. Hurricane-force winds with this low were mainly ahead of the occluded front approaching Greenland. A quikscat pass valid about six hours prior showed east winds up to 70 kts southwest of the southern tip of Greenland. The next storm in the series is shown south of

Newfoundland with a hurricane force label in the first part of **Figure 10**, intensifying to 953 hPa near the Grand Banks as shown in the second part of the figure, before turning northwest. Meanwhile a third developing storm moved southeast from Nova Scotia to become the hurricane-force low south of Newfoundland (**Figure 10**). This was a marginal hurricane-force event, supported by quikscat winds to 65 kts southwest and west of the center at 1000 UTC February 25, or two hours prior to the time of the second part of **Figure 10**. Selected platform and ship observations are listed in **Table 1**, with most observations taken in the strong second storm.

Figure 9. High-resolution QuikScat scatterometer image of satellite-sensed winds displaying the stronger winds around the south and north sides of the storm in the second part of **Figure 8**, valid at 0629 UTC February 14, 2006. The valid time of the pass is about six and one-half hours later than the valid time of the second part of **Figure 8**, with the center of the storm near the left edge of the figure at 56N. The southern tip of Greenland is at the upper left edge of the image.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.



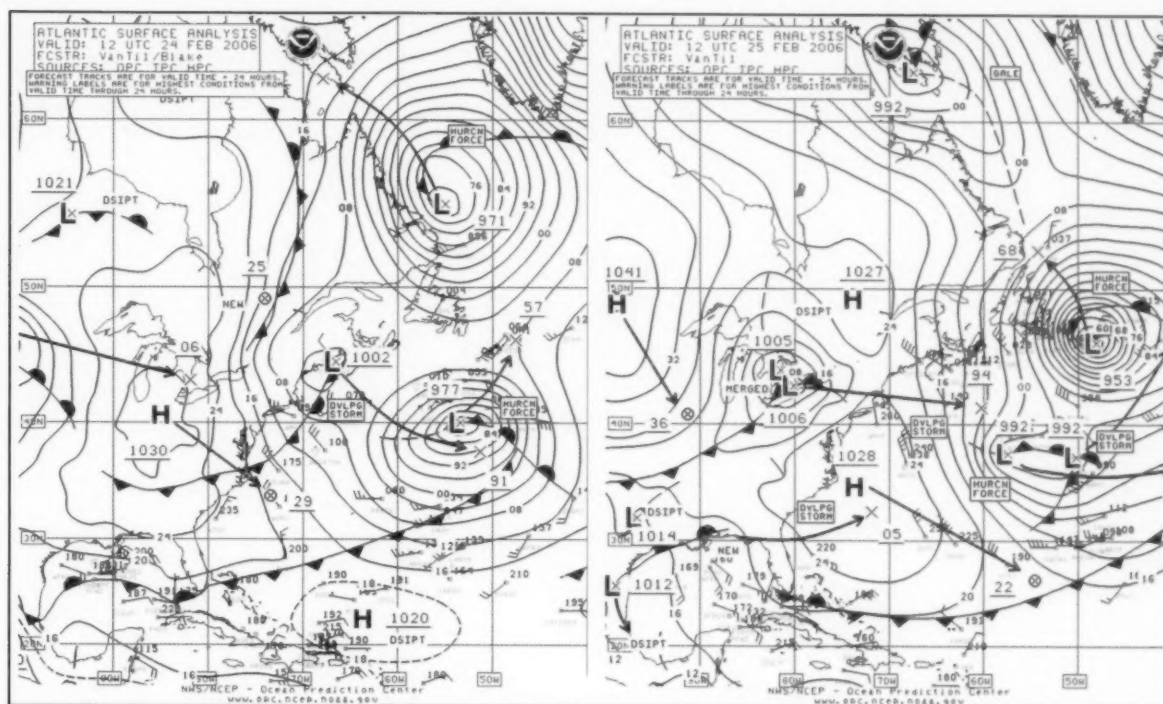


Figure 10. OPC North Atlantic Surface Analysis charts (Part 2) valid 1200 UTC February 24 and 25, 2006.

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND(kts)	SEAS(m/ft)
Hibernia HP6038	46.4N 48.4W	25/0300	NE 65	
		25/2100	SW 78	7.5/25
Platform VEP717	46.7N 48.7W	25/0300	NE 65	
		25/2100	SW 65	
Integrity (WDC6925)	41N 51W	24/1200	E 55	3.5/12
Raffles Park (A8DF8)	40N 46W	25/0000	W 55	6.5/21
Providence Bay				
Philadelphia Express (WDC6736)	39N 61W	25/0300	W 50	
Maersk Dauphin (MSTM6)	42N 50W	25/1200	NW 50	9.0/29
Oranjeborg (PIAG)	45N 37W	25/1800	SW 45	9.0/30
Atlantic Conveyor (SCKM)	46N 52W	25/1800	NW 50	9.5/31

Table 1. Some ship and platform observations taken during passage of the second storm as shown in Figure 10.



Figure 11 is a continuation of **Figure 10**, with the second storm shown moving into Labrador, while the third hurricane-force low is shown turning northwest in the first part of **Figure 11**, and is well inland in the second part of **Figure 11**. A fourth storm, shown in the Labrador Sea at 0000 UTC on the 28th, originated as the frontal wave of low pressure off the southeast U.S. coast 48 hours prior (first part of **Figure 11**). A fifth storm formed from the complex system southeast of Newfoundland in the second part of **Figure 11**, which followed the preceding storm through the Labrador Sea on March 1. Both of the last two produced hurricane-force winds in the Labrador Sea southwest of Greenland, up to 75 kts, as revealed in quikscat imagery, most widespread with the stronger fourth storm in the second part of **Figure 11**. Additional ship reports from the period of February 26 to March 1 are listed in **Table 2**.

North Atlantic Storm, March 4–7:
The blocking high pressure weakened

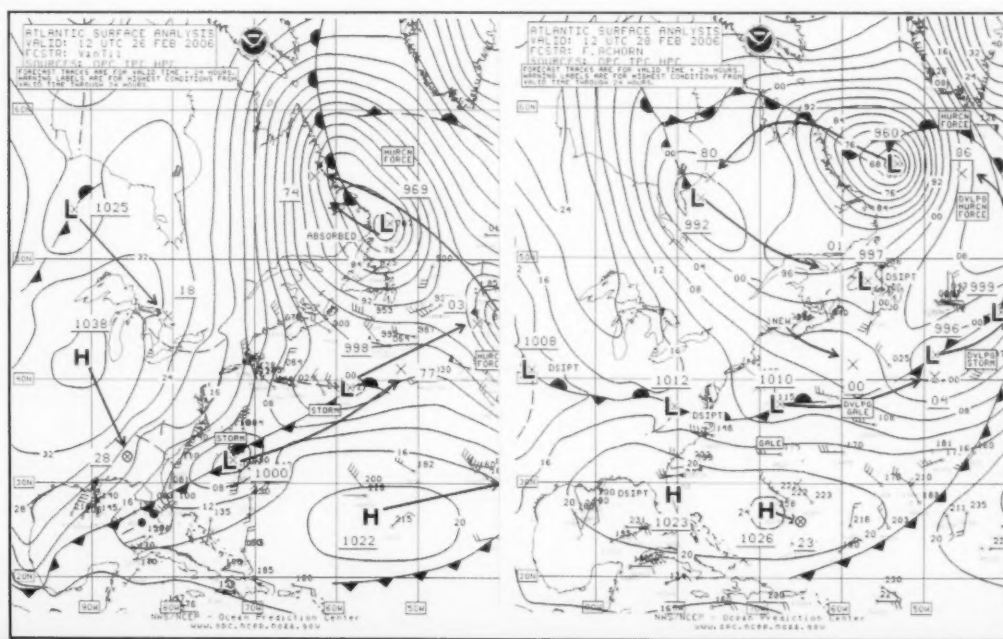
by this time, allowing this developing storm to take a more northeastward track. This storm developed a central pressure of 964 hPa near 56N 46W at 0000 UTC March 6, after originating about 450 nmi south of Newfoundland forty-eight hours prior. A frontal system extended northeast past Greenland, with winds up to 70 kts appearing in quikscat imagery between the front and the Greenland coast late on the 5th and early on the 6th. These winds were comparable to those found in a prior event such as the February 12–16 event. (See **Figure 9**.) Ships reported from areas outside the strongest winds, with the **Godafoss** (V2XM) observing southwest winds to 45 kts near 56N 39W at 0900 UTC March 6. Twenty-four hours prior, the ship **Hedwig Oldendorff** (A8FZ5) (45N 38W) reported the same winds along with seas of 7.0 m (23 ft). The storm weakened thereafter and moved northeast past Iceland on the 7th.

North Atlantic Storm, March 7–9:
This storm tracked farther south than

the March 4–7 storm during its initial development into a hurricane-force low, before swinging north toward Iceland. From 300 nmi east of Cape Race early on the 7th, the system moved northeast and intensified, developing a central pressure of 980 hPa near 55N 20W at 0000 UTC on the 9th. An unknown ship, V5XC9 near 44N 31W, reported west winds of 50 kts at 1200 UTC March 8. The cyclone briefly developed hurricane-force winds of 65 kts southwest of the center shortly thereafter, as revealed by a quikscat pass from 2143 UTC March 8. The storm subsequently turned north on the 9th and dissipated near Iceland on the 10th.

North Atlantic Storm of March 23–25: Blocking at high latitudes strengthened by the middle of March, forced this developing storm to take a more southern track. After moving off the North Carolina coast on the 21st, this low tracked east northeast and developed a lowest central pressure of 964 hPa near 41N 46W at 0000 UTC March 24 (**Figure 12**), when OPC

Figure 11. OPC North Atlantic Surface Analysis charts (Part 2) valid 1200 UTC February 26 and 28, 2006.



OBSERVATION	POSITION	DATE/TIME(UTC)	WIND(kts)	SEAS(m/ft)
CP Liberator (WGXN)	41N 44W	26/1200	W 50	11.0/36
Sealand Achiever (WPKD)	40N 41W	26/1200	NW 40	15.0/50
Maersk Phuket (MYMX5)	35N 36W	26/1200	SW 50	17.0/56
Genoa Senator (DPPH)	43N 40W	26/1800	W 45	13.0/42
Sealand Achiever (WPKD)	41N 39W	26/1800	W 40	11.5/38
Independence (WRYG)	34N 56W	27/0500	S 60	9.0/29
SHIP	40N 56W	27/1200	N 65	6.5/22
Napolean (VVGZ)	42N 47W	27/1200	SE 55	
Sealand Pride (WDB9444)	35N 60W	28/0000	W 40	11.5/38
Arina Arctica (OVYA2)	59N 44W	28/1200	E 50	
Godafoss (V2XM)	59N 32W	01/0600	E 60	
Atlantic Companion	50N 40W	01/1200	NW 35	10.0/32

Table 2. Some ship observations taken during the period of February 26 to March 1.

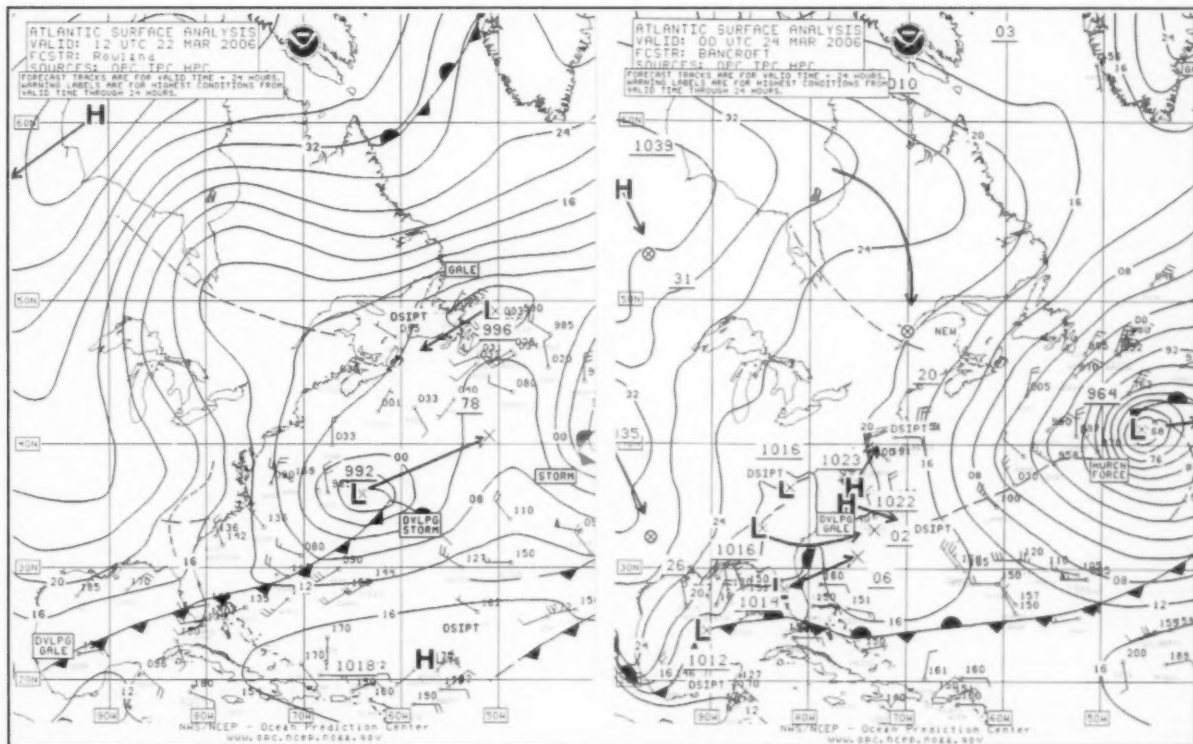


Figure 12. OPC North Atlantic Surface Analysis charts (Part 2) valid 1200 UTC March 22 and 0000 UTC March 24, 2006.



classified it as a hurricane-force storm. This was supported by a high-resolution quikscat pass from three hours earlier (**Figure 13**), which revealed 65 kts wind barbs southwest of the center and even one such barb southeast of the center. The winds began to decrease twelve hours later, although the lowest central pressure of 960 hPa was reached at 1800 UTC on the 24th. The cyclone weakened to a gale near 43N 26W late on the 25th, before turning more north and becoming wrapped up in a complex low-pressure system west of the British Isles by the end of the month.

Western Atlantic Storm of March 26–28: This developing storm originated near northern Florida early on the 24th and rapidly intensified after 0000 UTC on the 26th. **Figure 14** shows the final twenty-four hour period of development, with the second part showing the cyclone at maximum intensity. The quikscat winds in

Figure 15 collected close to the time of maximum intensity, show wind barbs up to 70 kts south and southwest of the center. Although the stronger winds are flagged as contaminated by rain, such contamination is usually less of a problem in that part of the storm's circulation. The cyclone maintained hurricane-force winds for about twelve hours, before weakening began early on the 27th. The

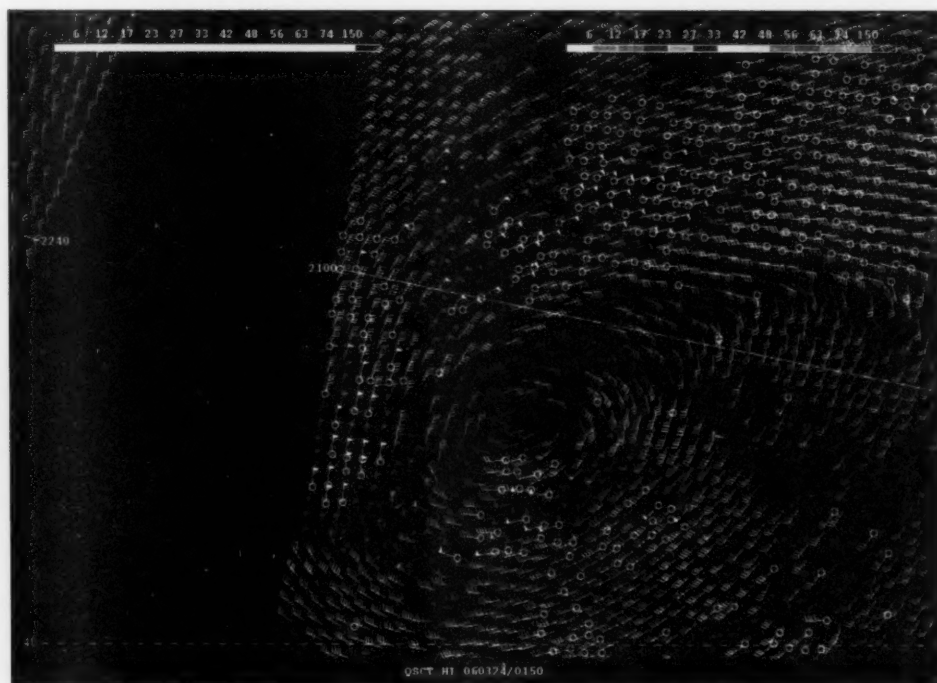
Choyang Honour (DADD) reported southwest winds of 60 kts and 10.5 m seas (34 ft) near 38N 60W at 1800 UTC March 26, and twelve hours later west winds of 45 kts and seas 10.5 m (35 ft) near 37N 58W. The **Lykes Navigator** (WGMJ) encountered north winds of 50 kts and 6.0 m seas (19 ft) near 43N 59W at 1300 UTC March 27. The Canadian buoy 44137 (42.3N 62.0W) reported northeast winds of 45 kts and 8.0 m seas (27 ft) at 1900 UTC on the 26th. The system subsequently weakened to a

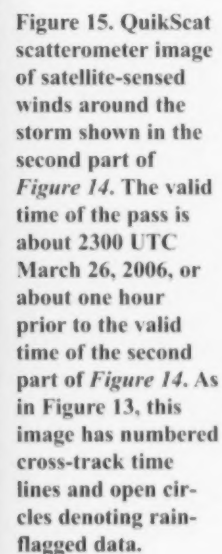
gale just southeast of the Grand Banks on the 28th, before redeveloping east toward Great Britain and weakening further near Portugal by March 31.

Storm off Southeast U.S. Coast, April 29–30: An area of low pressure moved off the U.S. southeast coast on April 27 and stalled in the vicinity of 32N 68W from the 29th through the 30th. Although the central pressure was only as low as 1007 hPa, building high pressure to the north caused winds and seas to increase north and northwest of the center. The ship **Elektra** (SIWB) (36N 72W) reported northeast winds of 60 kts at 0600 UTC on the 28th. Other ships reported winds in the 35 to 45 kts range through the 30th. The ship **Maersk Maine** (WAUY) (39N 67W) encountered north winds of 40 kts and 9.0 m seas (30 ft) at 0000 UTC April 30. The same ship reported northeast winds of 40 kts and seas 10.5 m (34 ft) near 39N 67W six hours later.

Figure 13. High-resolution QuikScat scatterometer image of satellite-sensed winds around the storm shown in the second part of Figure 12. The valid time of the pass is 2100 UTC March 23, 2006, or three hours prior to the valid time of the second analysis in Figure 12. The numbered diagonal line in the image is a cross-track time line of the satellite. Open circles denote rain-flagged data.

Image is courtesy of NOAA/NES-DIS/Office of Research and Applications.







Marine Weather Review—North Pacific Area January through April 2006

By George P. Bancroft, NOAA National Center for Environmental Prediction

Introduction

The most active period for hurricane-force lows was January and the first half of February, when all but two of the hurricane-force storms during the four-month period occurred, with eleven in January alone. The 500 hPa chart for 0000 UTC January 2 (Figure 1) is typical of the upper air pattern that produced this activity, featuring strong flow across the Pacific with embedded short-wave troughs, including, in some cases, northern and southern troughs that reinforce each

other. More information on use of the 500 hPa chart and the relationship of 500 hPa features to those at the surface may be found in *Reference 1*. In mid February the pattern changed, with the 500 hPa northern low replaced with a ridge, favoring some significant systems to move toward the Bering Sea or Kamchatka area with redevelopment toward the Gulf of Alaska and southeastward toward the west coast of the U.S. Other low-pressure systems became blocked and moved erratically or stalled. The two cyclones that produced hurricane-

force winds in March and April tracked from the western Pacific northeast into the Bering Sea. Due to the sheer number of strong systems during these stormy months, this article focuses mainly on hurricane-force lows.

No tropical cyclones appeared in OPC's oceanic chart area during this period. By comparison, there was a tropical storm and a typhoon in the waters south of Japan in the same four-month period of 2005.

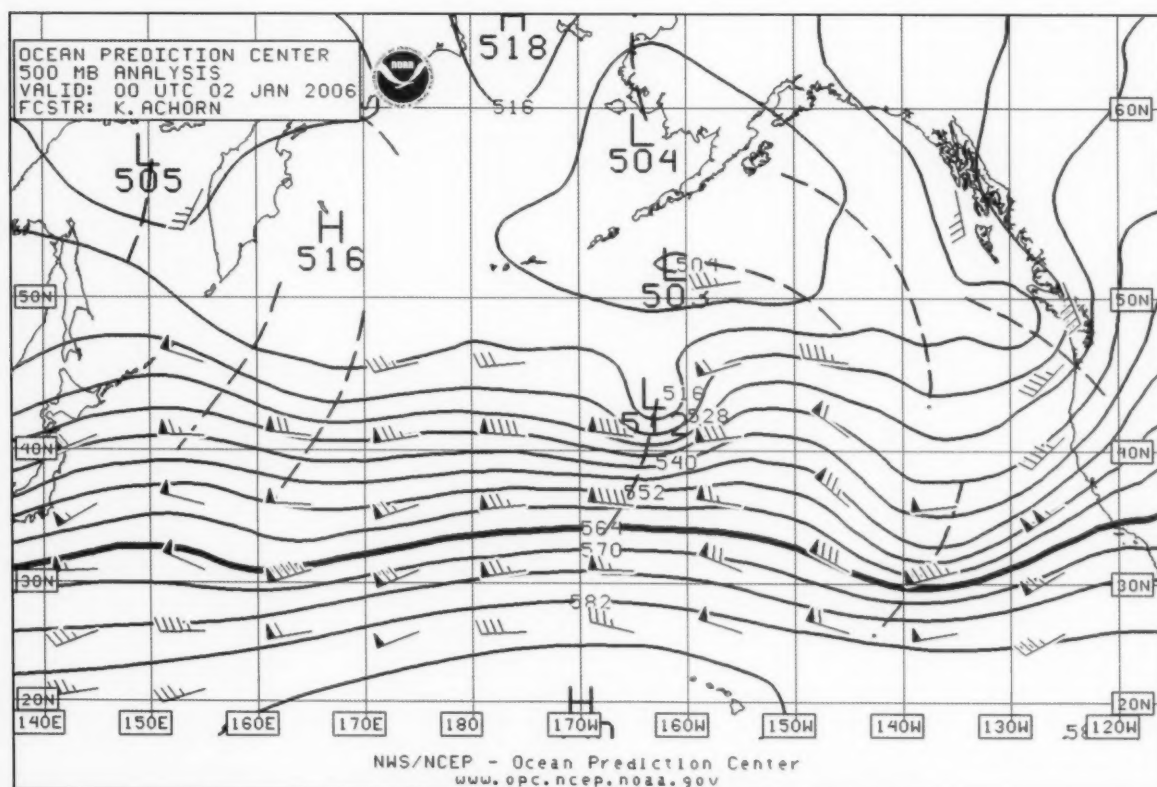


Figure 1. OPC North Pacific 500-MB Analysis valid 0000 UTC January 2, 2006. This chart is computer-generated, with short-wave troughs (dashed lines) manually added.

Significant Events of the Period

Northeast Pacific Storm, January 1–2: The period started out very active, with two hurricane-force lows occurring at the same time with more soon to follow. **Figure 2** shows one of these at maximum intensity affecting the waters off the Pacific Northwest coast. As the storm center passed north of the buoy 46002 (42.6N 130.4W), the wind at the buoy reached 41 kts with gusts to 76 kts from the southwest at 0700 UTC

January 1. Buoy 46015 (42.7N 124.8W) near the coast reported south winds of 45 kts with gusts to 56 kts and 7.5 m seas (25 ft) at 1400 UTC January 1, followed one hour later by peak gusts of 60 kts and seas of 8.0 m (26 ft). The Destruction Island C/MAN (DESW1) off the Washington coast reported southeast winds of 49 kts with gusts to 59 kts, and a peak gust 70 kts, at 2300 UTC January 1. The storm subsequently moved north, weakened, and dissipated over Southeast Alaska late on the 2nd.

Central Pacific Storm, January 1–4: This compact system is shown in **Figure 2** south of the central Aleutians. It had deepened rapidly, by 21 hPa, in the preceding twelve hours. The central pressure bottomed out at 966 hPa twenty-four hours later, and the system maintained hurricane-force winds for about 36 hours. Ship reports in the area had winds of 45 kts or less. The **President Polk** (WRYD) reported a northwest wind of 45 kts and 8.0 m seas (27 ft) near 46N 151W at 1800 UTC January 2, while the **Mokihana** (WNRD) observed south-

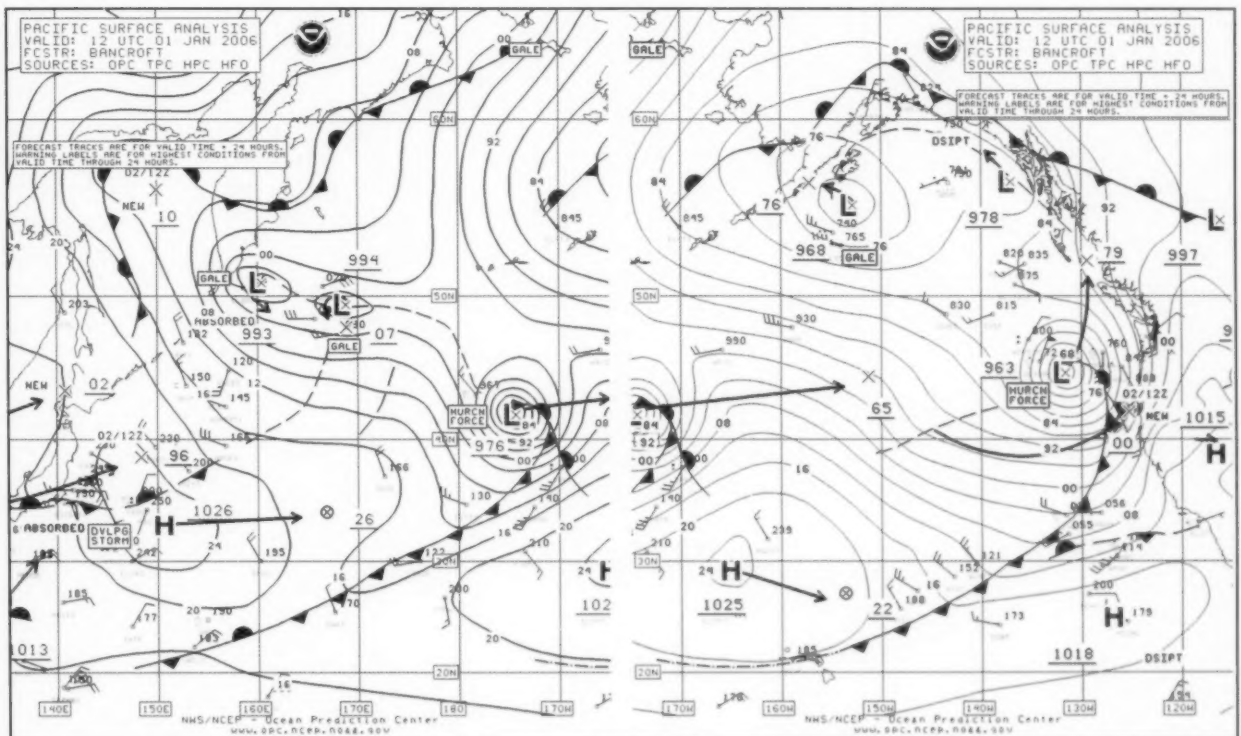


Figure 2. OPC North Pacific Surface Analysis charts (Parts 1 and 2) valid 1200 UTC January 1, 2006.



east winds of 40 kts and 9.0 m seas (30 ft) near 47N 144W. A quikscat pass at about 1530 UTC January 1 (**Figure 3**) reveals a compact but potent circulation with wind barbs of 80 kts south of the center. The cyclone turned more north and slowed upon reaching 145W late on the 2nd, before looping back to the west (**Figure 4**) and becoming absorbed by the next eastern North Pacific storm described below.

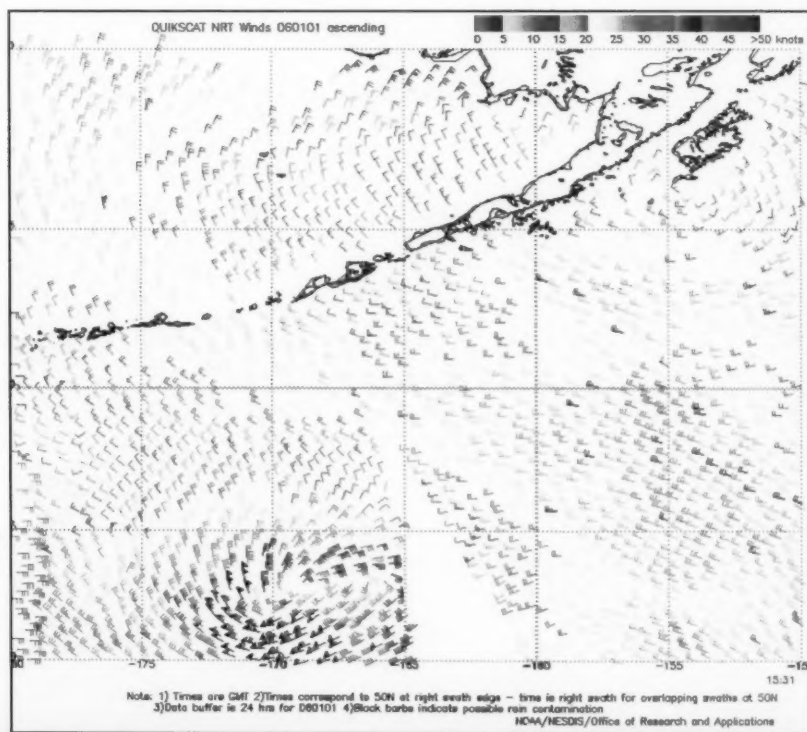
Northwest Pacific Storm of January 2–4: This cyclone formed, like so many others, near Japan early on January 2 and moved northeast while rapidly intensifying. The central pressure fell 39 hPa in the twenty-four hour period ending at 1200 UTC January 3, when the center was near 45N 152E with a 958 hPa pressure.

Figure 4 depicts the storm at maximum intensity with a 954 hPa central pressure six hours later. A high-resolution quikscat pass from 0817 UTC January 3 (**Figure 5**) reveals winds to 65 kts south of the center in the lower left side of the image, and a larger swath of 50 to as much as 65 kts in the southeast flow ahead of the storm's frontal system. The ship **Westwood Anette** (C6Q09) (48N 152E) encountered northeast winds of 55 kts at 0000 UTC on the 4th. The storm then drifted northeast and weakened near the Kamchatka Peninsula by the 5th.

Eastern North Pacific Storm, January 3–5: This development appears on **Figure 4** as the 995 hPa frontal low-pressure wave near 32N 151W that is forecast to develop hur-

ricane-force winds within 24 hours as it moves northeast while rapidly intensifying. The central pressure bottomed out at 964 hPa as the center moved to 42N 140W twenty-four hours later. The central pressure fell 39 hPa in the twenty-four hour period ending at 1200 UTC January 4. A quikscat image from about 0600 UTC on the 4th, or twelve hours after the valid time of **Figure 4**, revealed a compact circulation similar to that of **Figure 3**, with winds to 80 kts south of the center. The ship **A8CF4** (29N 155W) reported west winds of 50 kts at 1800 UTC on the 3rd. The system weakened beginning later on the 4th while moving northeast, before turning northwest and weakening to a gale in the Gulf of Alaska on the 5th. Dissipation followed later on the 7th near the Alaskan coast.

Figure 3. QuikScat scatterometer image of satellite-sensed winds around the central North Pacific storm shown in **Figure 2**, valid at 1531 UTC January 1, 2006, or about three and one-half hours later than the valid time of **Figure 2**. The resolution is 25 km. Image is courtesy of NOAA/NESDIS /Office of Research and Applications.



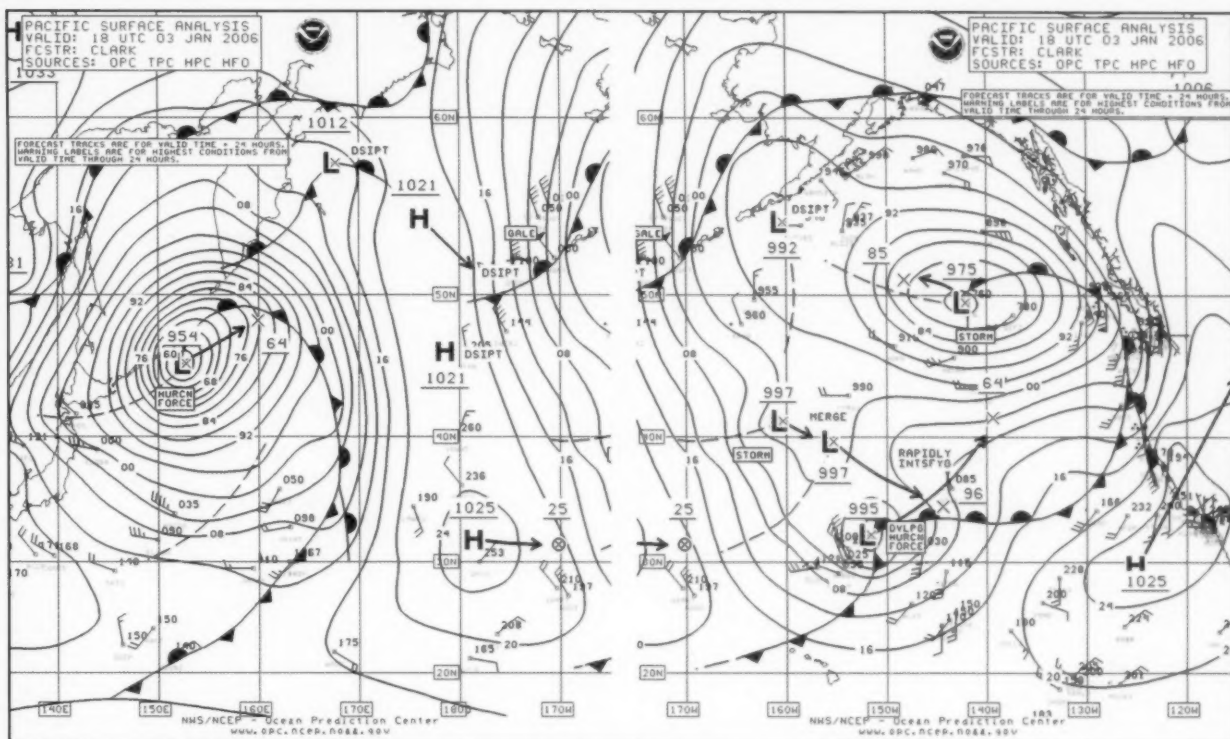


Figure 4. OPC North Pacific Surface Analysis charts (Parts 1 and 2) valid 1800 UTC January 3, 2006.

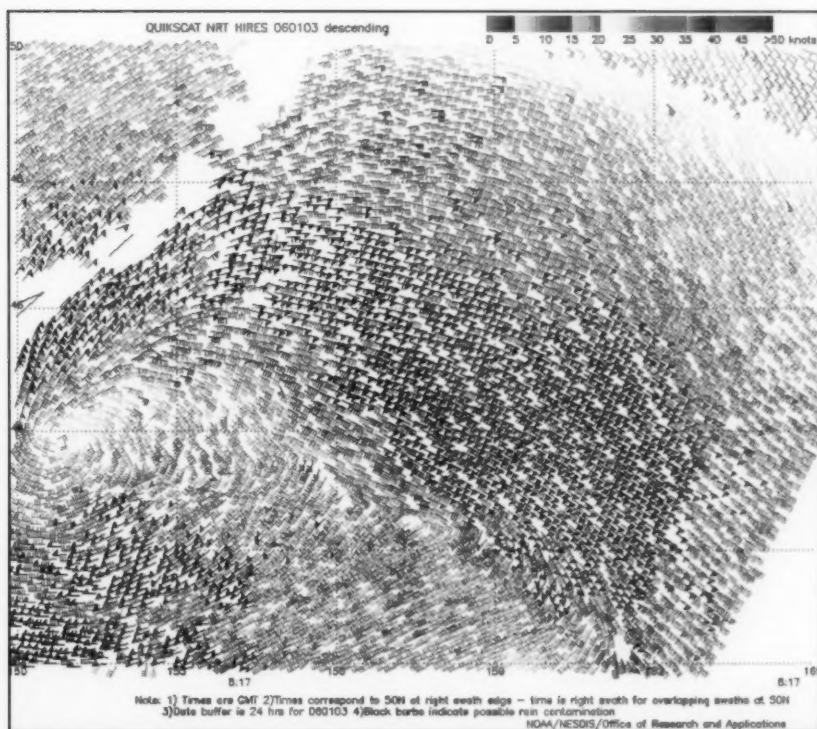


Figure 5. High-resolution QuikScat scatterometer image of satellite-sensed winds around the western storm shown in Figure 4. The resolution is 12.5 km, versus 25 km in the coarser-resolution version of QuikScat imagery. The valid time of the pass is 0817 UTC January 3, 2006, or about ten hours prior to the valid time of the second part of Figure 4.

Image is courtesy of NOAA/NESDIS/ Office of Research and Applications.



Western North Pacific Storm, January 6–9: *Figure 6* depicts the development of this storm, with the central pressure dropping an impressive 33 hPa in twenty-four hours. The storm is shown at maximum intensity, 965 hPa, in the second part of *Figure 6*. The high-resolution quikscat data in *Figure 7* from 1935 UTC January 7 reveal winds to 70 kts west and especially south of the well-defined center in an area lacking in ship reports. The ship *Sealand Comet* (WDB9950) (40N 153E) reported north winds of

40 kts and 9.5 m seas (31 ft) at 1800 UTC on the 7th. The cyclone maintained hurricane-force winds through 1200 UTC on the 8th and began to weaken. Later on the 8th, the storm, near 44N 171E elongated east-north-east with multiple centers, with a lead low center moving to Vancouver Island as a gale late on the 10th.

Western North Pacific Storm, January 15–16: This developing storm moved northeast from near Tokyo early on January 14, with the

first part of *Figure 8* showing the storm at maximum intensity with a central pressure of 968 hPa. A vessel with the SHIP callsign near 45N 162E reported northeast winds of 50 kts and 8.0 m seas (26 ft). A high-resolution quikscat pass from 0740 UTC on the 16th showed the strongest winds 65 to as high as 80 kts southwest of the center. The system weakened to a gale south of the Aleutians early on the 17th and then continued east-north-east, dissipating north of Vancouver Island by the 20th.

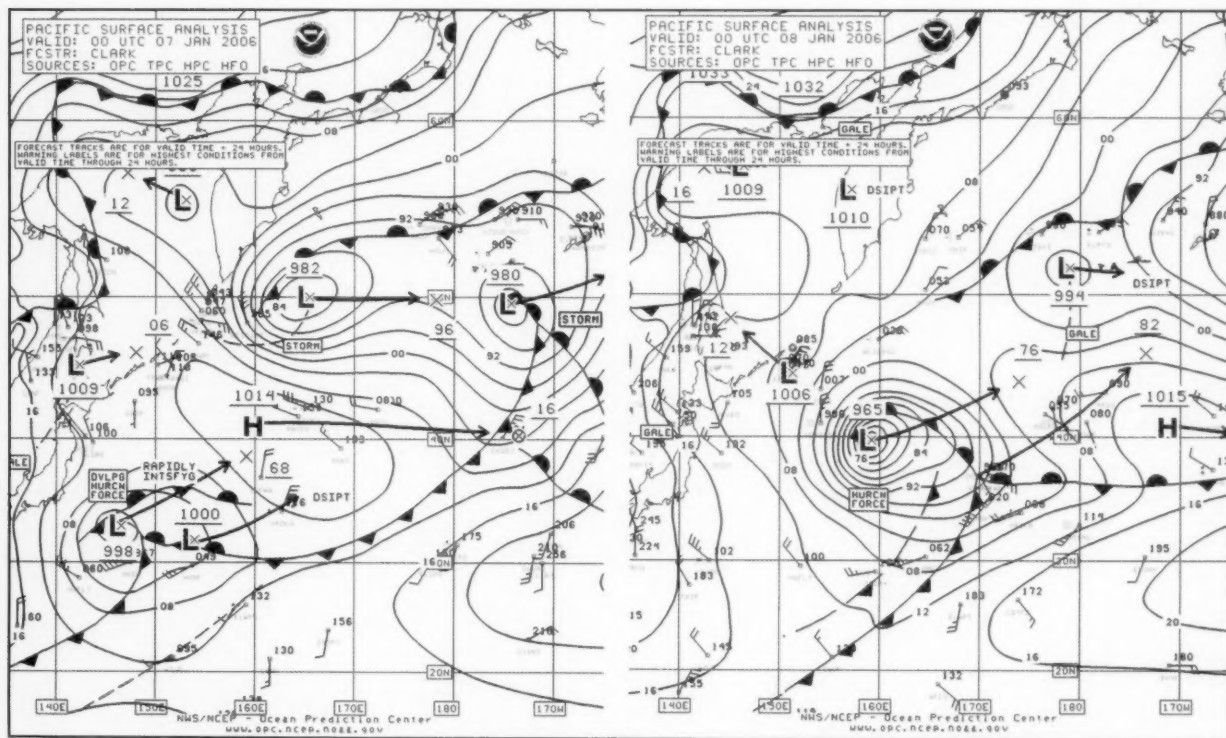
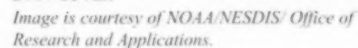


Figure 6. OPC North Pacific Surface Analysis charts (Part 2 - west) valid 0000 UTC January 7 and 8, 2006.





Western North Pacific Storm of January 17–19: This storm originated as a weak low-pressure wave south of Japan at 0600 UTC January 16 (*Figure 8*) and moved northeast, with the central pressure falling 27 hPa in the twenty-four hour period ending at 0000 UTC on the 18th. The second part of *Figure 8* shows the storm near 40N 167E near maximum intensity, with a relatively compact appearance. An infrared satellite image valid at the same time (*Figure 9*) shows a well developed comma cloud formation with the cold cloud tops indicating considerable vertical extent of the system. Also clouds, a dry slot wrap around a well defined center, and convective clouds south and west of the center indicate unstable conditions and stronger winds. The high-resolu-

tion quickscat image from 1836 UTC on the 17th (*Figure 10*) reveals winds up to 75 kts south and west of the center, which is likely over relatively warm water. The stronger winds near the east edge may be associated with the front and may be unreliable due to rain contamination. The ship **YM Ibiza** (DGKV) (36N 162E) reported south winds of 60 kts and 9.0 m seas (29 ft) at 1500 UTC January 17. A weakening trend began early on the 18th as the system headed northeast and elongated toward the Gulf of Alaska, with dissipation near the Alaska coast on the 21st.

Northwest Pacific Storm of January 17–19: The low near Sakhalin Island in the first part of *Figure 8* moved to the northern Kurile Islands on the

17th, where it slowed and looped back to the southwest while intensifying to a hurricane-force low briefly as in the second part of *Figure 8*. The **President Polk** (WRYD) reported a west wind of 65 kts and 13.5 m seas (44 ft) near 47N 152E at 0600 UTC January 18. The cyclone then lingered near the Kuriles and weakened to a gale on the 19th, before dissipating just north of Japan by the 21st.

Western North Pacific Storm, January 21–24: *Figure 11* depicts the rapid development of this storm over a twenty-four hour period, during which the central pressure fell 38 hPa. The lowest central pressure of 952 hPa reached at 1800 UTC on the 22nd made this cyclone the most intense of the period in the North

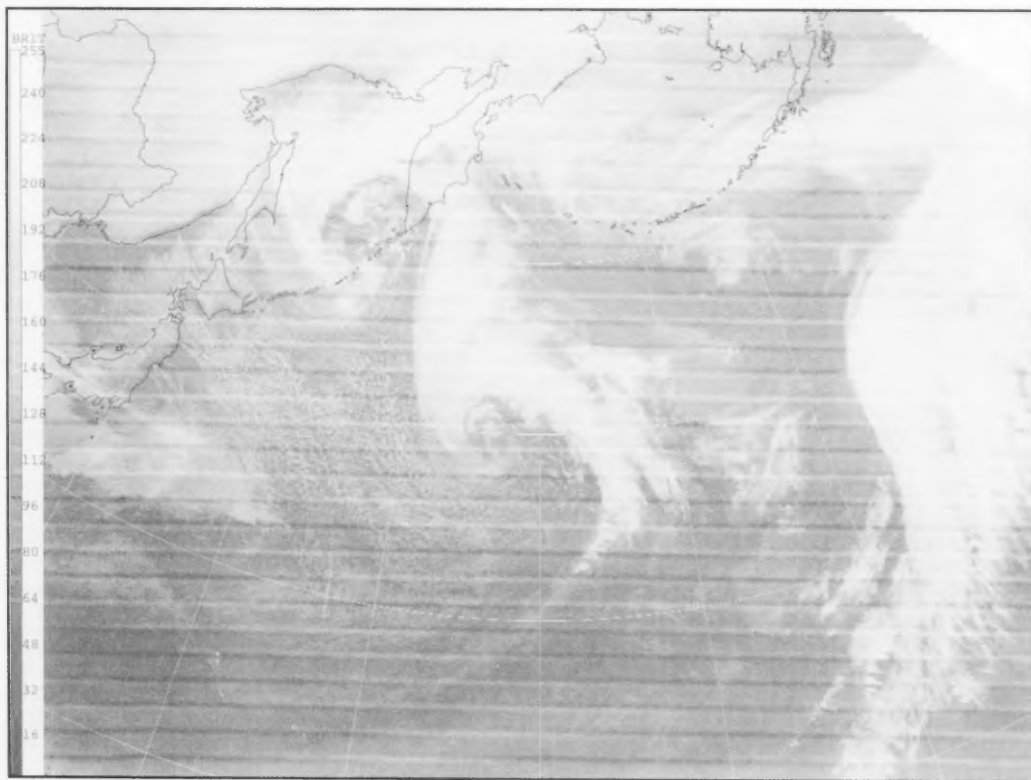


Figure 9. GMS-MTR infrared satellite image of the storm in *Figure 8* valid at 0600 UTC January 18, 2006. Satellite senses temperature on a scale from black (warm) to white (cold) in this type of image. The valid time is the same as that of the second part of *Figure 8*.

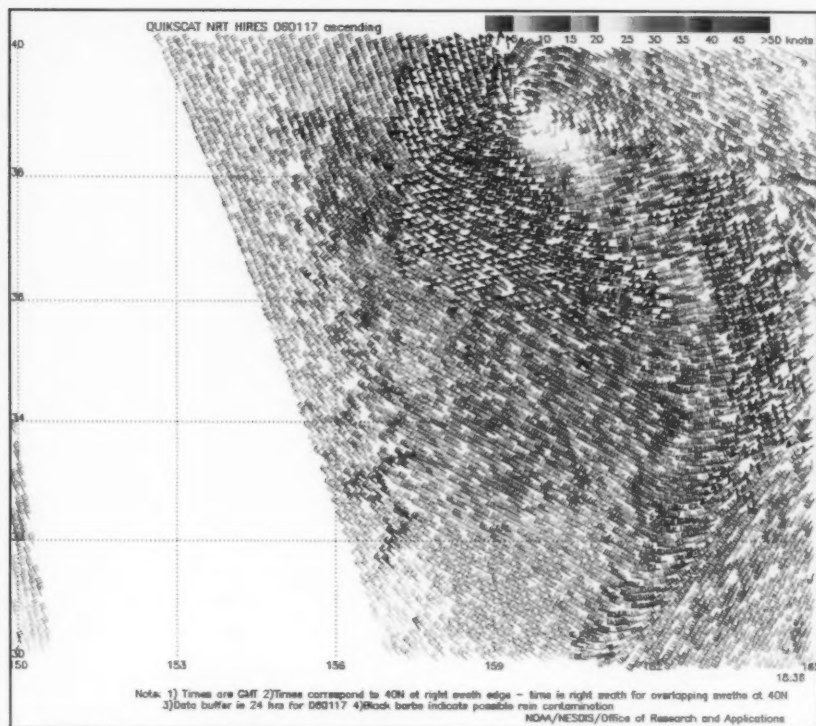


Figure 10. High-resolution QuikScat scatterometer image of satellite-sensed winds around the southern storm shown in the second part of Figure 8. The valid time of the pass is 1836 UTC January 17, 2006, or about eleven and one-half hours prior to the valid time of the second part of Figure 8. The center of the storm is apparent in the upper portion of the figure near 39N 159E.

Image is courtesy of NOAA/NESDIS/ Office of Research and Applications.

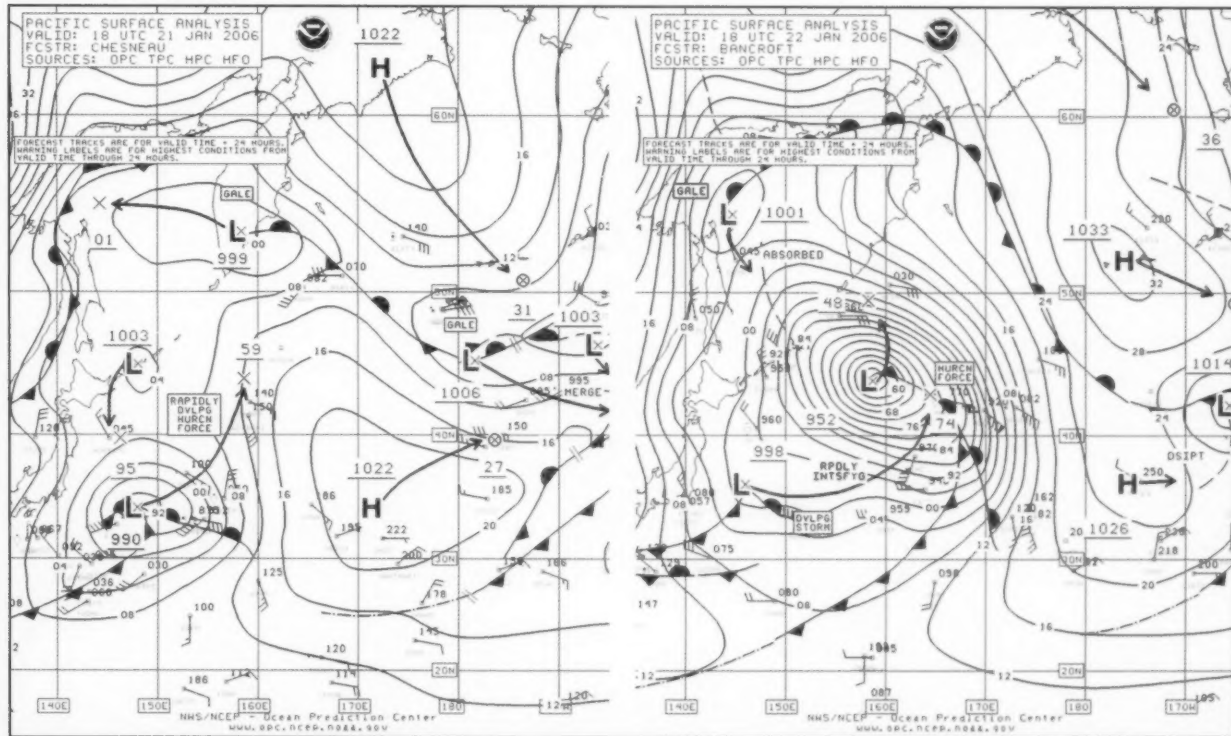


Figure 11. OPC North Pacific Surface Analysis charts (Part 2) valid 1800 UTC January 21 and 22, 2006.



Pacific. The abundant reports of high winds and seas from ships are listed below in **Table 1**. The cyclone drifted north and began to weaken on the 23rd, and then looped northwest and then southeast near the northern Kurile Islands and weakened to a gale late on the 24th, before moving southwest and dissipating east of northern Japan on January 28.

North Pacific Storm of January

28–31: A developing frontal wave of low pressure passed southeast of Japan early on the 27th before turning more northeast on the 28th and rapidly intensifying. The center reached 43N 173E with a 966 hPa pressure at 1200 UTC on the 29th, after deepening

by 31 hPa in the preceding twenty-four hours. OPC classified this cyclone as a hurricane-force low briefly, from 1200 UTC to 1800 UTC on the 29th. The center then redeveloped east-northeast under the influence of blocking to the northwest and moved into Southeast Alaska late on the 31st.

North Pacific Storm, February 1–4:

Figure 12 captures the initial rapid development of this storm. The central pressure dropped 44 hPa in the twenty-four hour period ending at 0000 UTC February 2, and the lowest pressure of 962 hPa came twelve hours later at 1200 UTC on February 2. The cyclone then tracked east

northeast and did not begin weakening until early on the 3rd. A quikscat pass from 0840 UTC February 2, or close to the time of the second part of **Figure 12**, showed winds to 70 kts southwest of the center and looked similar to **Figure 10**. Twelve hours later quikscat data showed that winds had shifted to south of the center and speeds were as high as 75 kts. This event was notable in that the hurricane-force winds lasted about 48 hours, when twelve hours or less is more common. Some ship reports from the storm are listed in **Table 2**. The cyclone moved into the southeast Bering Sea as a gale late on the 4th, stalled and dissipated by the 6th.

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND(kts)	SEAS(m/ft)
Zim America (9HAB8)	42N 164.5E	22/1200	E 60	10.5/35
	42.6N 166E	22/1800	E 56	
Kaga (JRES)	42N 162E	22/1200	SE 55	7.5/25
Sine Maersk (OZOK2)	42N 170E	22/1800	SE 74	
APL Korea	44N 171E	22/1700	SE 75	
APL Korea (WCX8883)	47N 175E	23/0600	SE 65	10.5/34
	48N 177E	23/1200	S 50	17.5/57
CSX Spirit (WFLG)	40N 174E	23/0000	S 45	11.5/38
Zim Canada (4XGS)	49N 156E	23/0600	NE 50	10.5/34

Table 1. Some ship observations taken during storm of January 21–24.

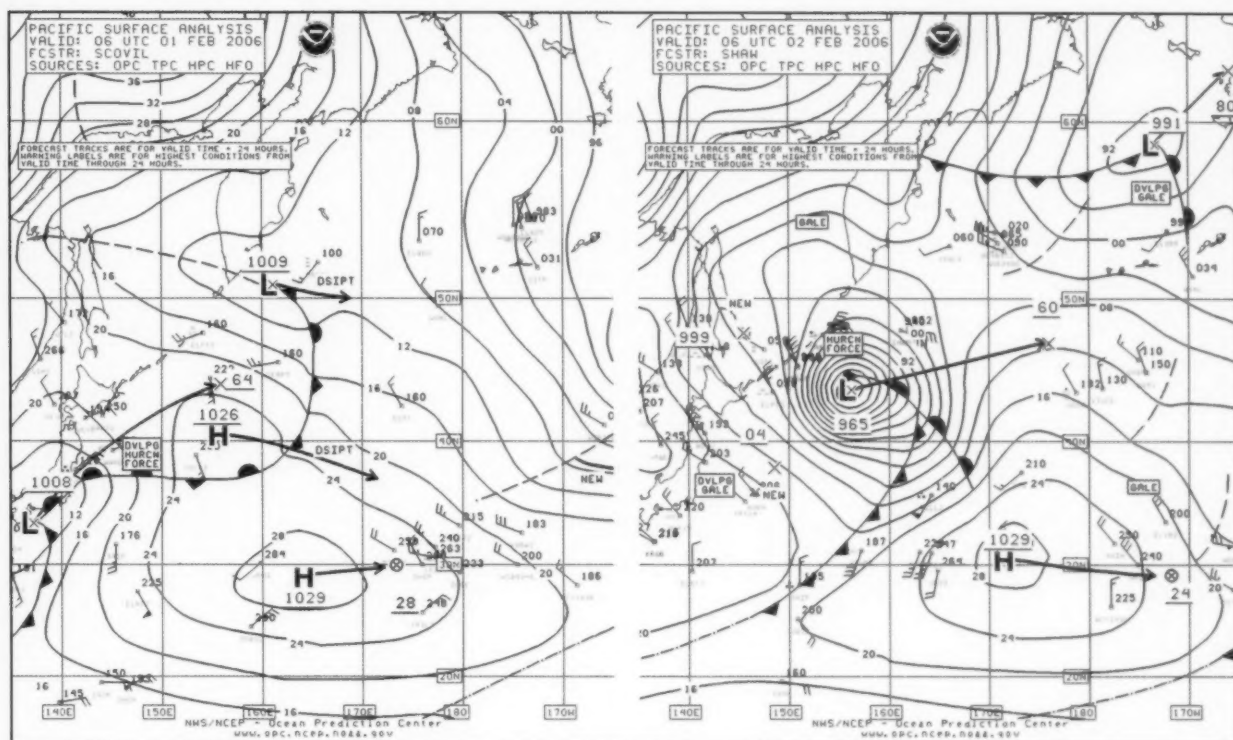


Figure 12. OPC North Pacific Surface Analysis charts (Part 2) valid 0600 UTC February 1 and 2, 2006.

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND(kts)	SEAS(m/ft)
Mokihana (WNRD)	42N 149E	1/1800	N 60	7.0/23
Hanjin Ottawa (DANM)	44.6N 150E	2/0900	NW 50	8.5/28
	43N 148E	2/1500	W 60	
Polar Eagle (ELPT3)	42N 147E	2/1500	W 50	
APL Canada (A8CG6)	46N 152E	2/1200	NW 50	5.5/18

Table 2. Some ship observations taken during storm of February 1-4.



Northeast Pacific Storm of February 2-4: The development of this storm from a frontal wave of low pressure is depicted in **Figure 13**. The track was similar to that of the January 1-2 event. The central pressure dropped 34 hPa in the twenty-four hour period ending at 1800 UTC on the 3rd, when the lowest central pressure of 970 hPa was reached. Selected observations taken during the

storm from buoys, ships and coastal automated stations are listed in **Table 3**. This storm is most noteworthy for several reports of seas higher than 12 m (40 ft), even at Buoy 46050 that is near the Oregon coast. The storm subsequently moved inland on the 4th.

North Pacific and Bering Sea Storm, February 12-14: An eastern Pacific high strengthened by the middle of February developed lows com-

ing off Japan and began to turn more north into the Bering Sea. The developing storm in **Figure 14** came off Japan early on February 11 and rapidly deepened, especially in the twenty-four hour period ending at 0000 UTC February 13 when the central pressure fell 32 hPa. The cyclone is shown at maximum intensity (956 hPa) in the second part of **Figure 14**, as the center turned north near the dateline. A

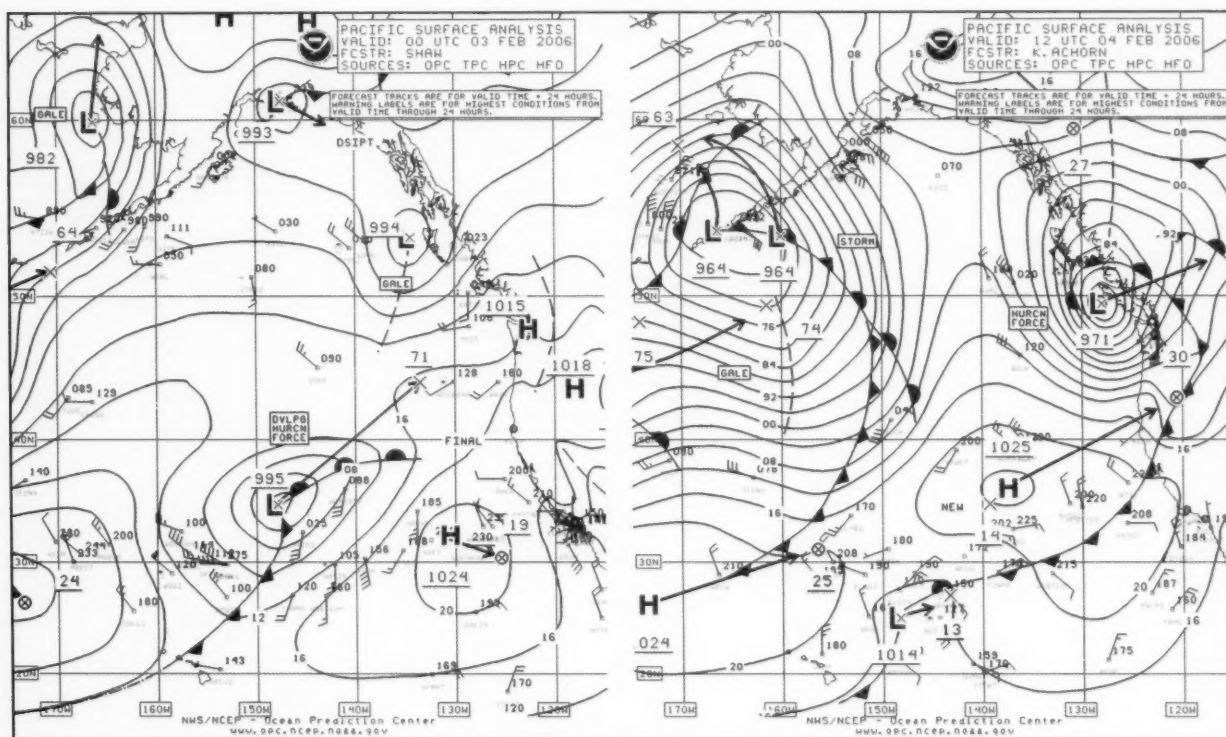


Figure 13. OPC North Pacific Surface Analysis charts (Part 1 - east) valid 0000 UTC February 3 and 1200 UTC February 4, 2006.



OBSERVATION	POSITION	DATE/TIME(UTC)	WIND(kts)	SEAS(m/ft)
Horizon Tacoma (KGTy)	48.5N 125.7W	4/1800	W 70	13.5/45
Liberty Star (WCBP)	41N 134W	3/2200	SW 60	17.5/57
	40N 135W	4/0600	W 40	14.5/47
Tatoosh (TTIW1)	48.9N 124.6W	4/1200	S 60	
Buoy 46002	42.6N 130.4W	4/0400	W 45	10.5/35
		4/0300	maximum 12.0/40	
Buoy 46006	41N 138W	3/1900	W 50	8.0/26
		3/2300	maximum 9.5/31	
Buoy 46050	44.6N 124.5W	4/1400	SW 35	12.5/41

Table 3. Some ship observations taken during storm of February 2-4. Maximum seas refer to the highest significant wave height, or the average height of the highest one-third of waves.

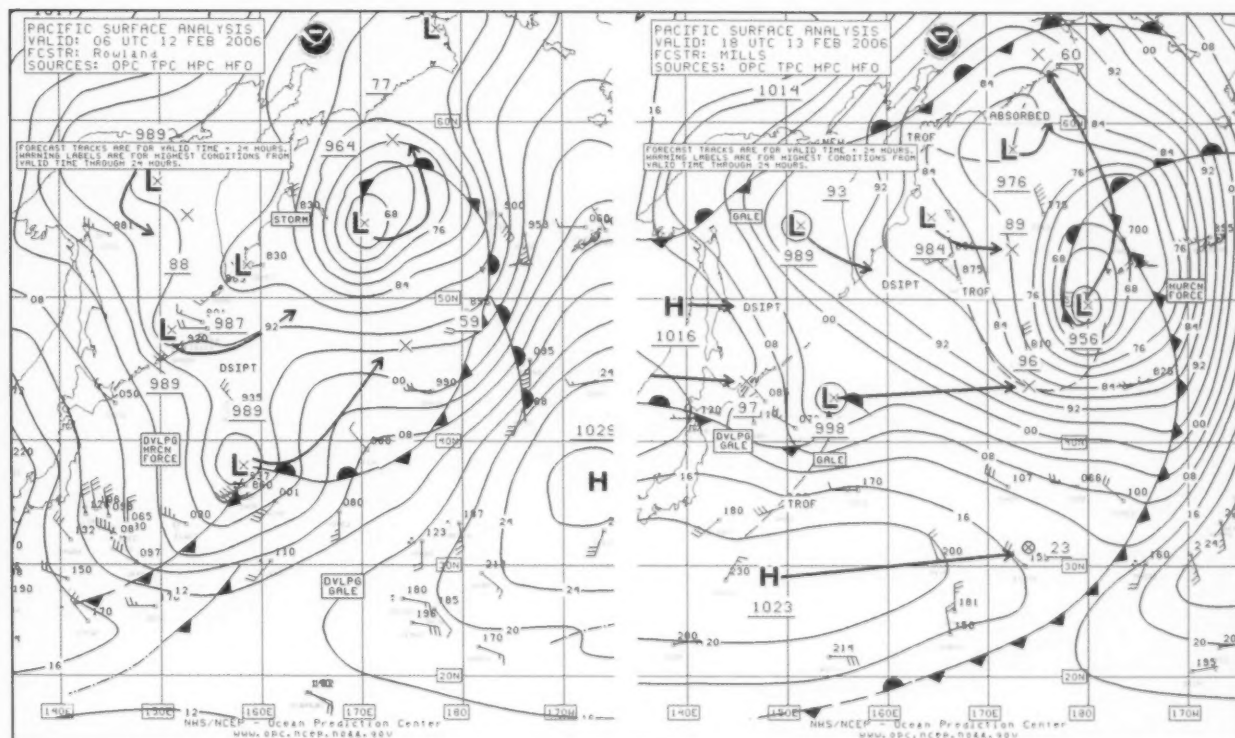


Figure 14. OPC North Pacific Surface Analysis charts (Part 2) valid 0600 UTC February 12 and 1800 UTC February 13, 2006.



high-resolution quikscat pass from 1658 UTC on the 13th (**Figure 15**) reveals winds up to 65 kts mainly ahead of the cold front east of the center, unlike in prior storms previously dealt with. Winds decreased to below hurricane force as the center moved into the Bering Sea early on the 14th. At 0000 UTC on the 14th the ship **Green Dale** (WCZ5238) (53N 168W) reported south winds of 50 kts. Two hours later the buoy 46072 (51.6N 172.2W) reported south winds of 35 kts and seas up to 9.5 m (31 ft). The system then weakened while redeveloping northward in the Bering Sea and moved inland over Russia late on the 14th.

Bering Sea Storm, March 15–17:

This developing storm followed a track similar to and slightly west of that of the mid-February event and was almost as intense, but the main intensification into a hurricane-force storm occurred as the cyclone crossed the western Aleutians. The central pressure lowered from 990 hPa (near 44N 167E) to 958 hPa (near 53N 177E) in the twenty-four hour period ending at 1200 UTC on the 16th, a

drop of 32 hPa. A high-resolution quikscat pass indicated winds up to minimal hurricane force southeast and north of the center as it was crossing the western Aleutians. Some ship and buoy observations taken in the storm are listed in **Table 4**. Also, unlike the mid-February storm, this cyclone subsequently turned east toward Alaska and dissipated in the northeast Bering Sea on the 18th.

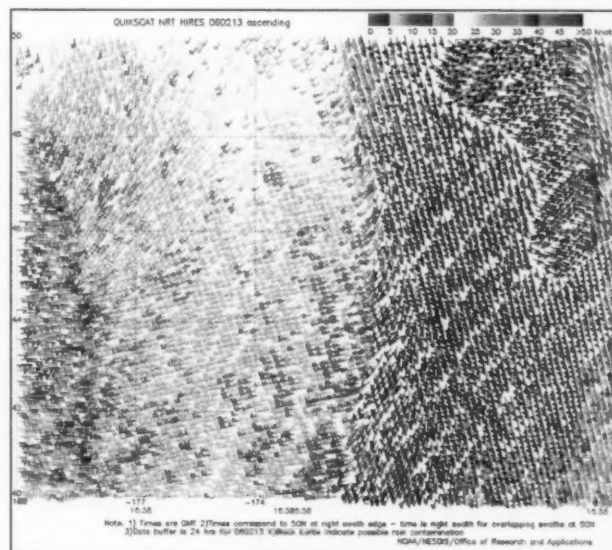
Western North Pacific and Bering Sea Storm of April 4–7: A rapidly

developing storm moved east of Japan at 0600 UTC April 5 already with a 994 hPa central pressure, and deepened to a hurricane-force storm twelve hours later. **Figure 16** depicts the subsequent motion and intensification of this system over a thirty-six hour period in which the cyclone maintained hurricane-force winds. The second part of **Figure 16** shows the storm at maximum intensity over the far western

Aleutians. The compact appearance of the storm in the first part of **Figure 16** is also reflected in the high-resolution quikscat pass two hours later (**Figure 17**) which has hurricane-force wind barbs, up to 80 kts, within 60 to 120 nmi south and west of the center. At 1800 UTC on the 7th the ship **Bosporus Bridge** (3FMV3) (50N 162E) reported north winds of 60 kts. Buoy 46072 (51.6N 172.2W) reported southwest winds of 25 kts but 11.0 m seas (36 ft) at 2200 UTC April 7. The **Vincent Thomas Bridge** (H3WJ) (54N 176W) encountered southwest winds of 45 kts and 11.5 m seas (37 ft). The cyclone continued on a north-eastward track and weakened to a gale in the central Bering Sea late on the 7th and then moved inland over mainland Alaska late on the 9th.

Figure 15. High-resolution QuikScat scatterometer image of satellite-sensed winds around the southeast side of the storm shown in the second part of **Figure 14**. The valid time of the pass is 1658 UTC February 13, 2006, or about one hour prior to the valid time of the second part of **Figure 14**. The wind directions near the lower left edge of the image are erroneous.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.



OBSERVATION	POSITION	DATE/TIME(UTC)	WIND(kts)	SEAS(m/ft)
Sealand Intrepid (WDB9949)	54N 173E	16/0600	NE 45	6.5/21
Skaubryn (LAJV4)	54N 167E	16/1500	NE 50	
Bering Leader (WDC7227)	59N 178W	16/1700	NE 55	8.0/27
APL Philippines WCX8884	53N 168E	17/0000	NW 40	8.5/28
Buoy 46071	51.2N 179.2E	16/1000	SW 45	9.0/30
		16/2300	SW 35	10.5/35
Buoy 46072	51.6N 172.2W	17/1300	SW 30	10.5/34

Table 4. Selected ship and buoy observations taken in the storm of March 15–17.

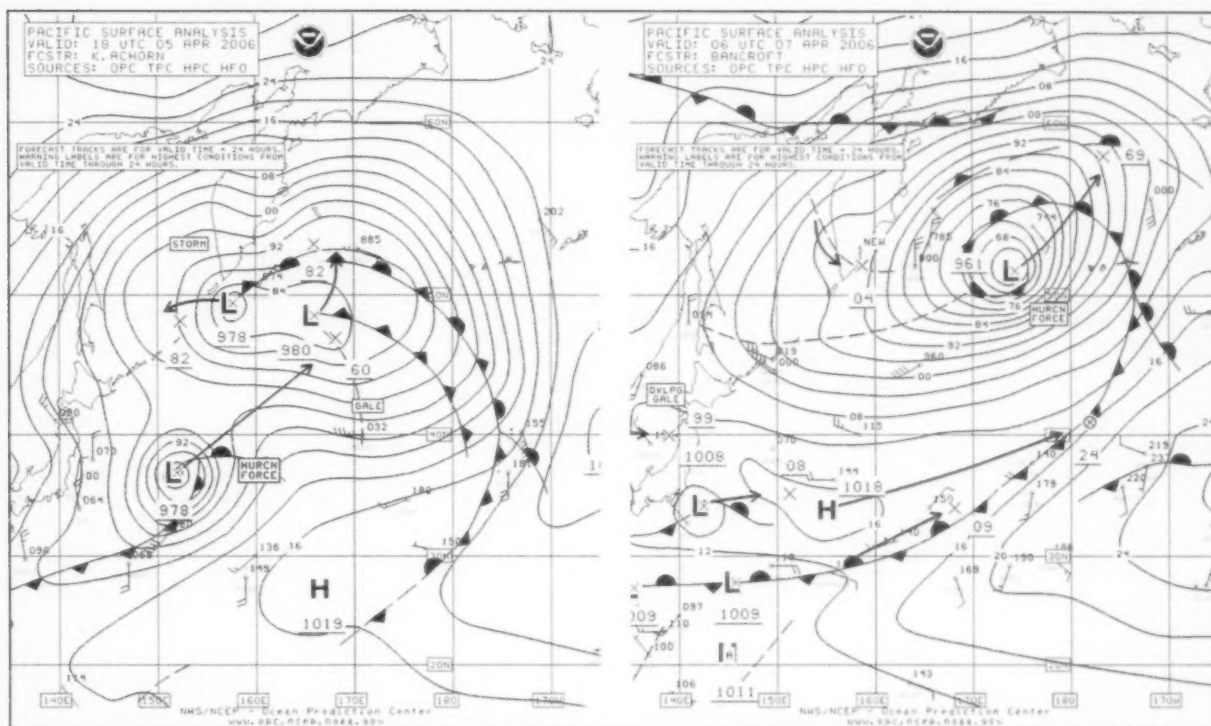


Figure 16. OPC North Pacific Surface Analysis charts (Part 2) valid 1800 UTC April 5 and 0600 UTC April 7, 2006.

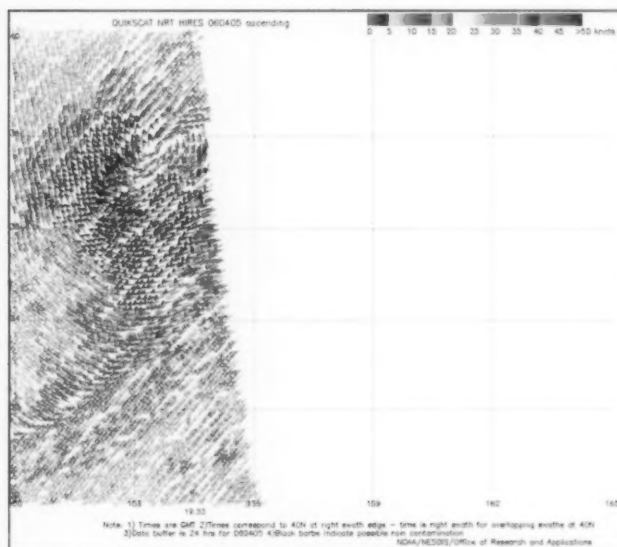


Figure 17. High-resolution QuikScat scatterometer image of satellite-sensed winds around the storm shown in the second part of Figure 16. The valid time of the pass is 1955 UTC April 5, 2005, or about two hours later than the valid time of the first part of Figure 16. The center of the storm is apparent near 38N 153E.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.

Bering Sea Storm, April 14–17: This developing storm followed a track similar to that of the early April event, originating as a frontal wave of low pressure east of Japan on the 13th and becoming a large storm in the central Bering Sea with a 970 hPa central pressure at 1200 UTC on the 16th. The winds did not quite reach hurricane force, but seas were quite high intensity. The ship **Sicilia** (9HCP7) (52N 170W) reported northwest winds of 50 kts and 17.0 m seas (56 ft) at 0000 UTC on the 17th, although the author is unsure of the reliability of that report. The buoy 46035 (57.1N 177.5W) reported west winds of 50 kts and 7.5 m seas (25 ft) at 1800 UTC on the 16th with a maximum significant wave height of 11.0 m (36 ft) four hours later. The strongest wind reported was a west wind of 60 kts from the **Corbin Foss** (WDB5265) (52N 177W) at 1800 UTC April 16. The cyclone subsequently turned southeast into the Gulf of Alaska as a gale on the 18th in response to building high pressure behind the departing low.

Reference

- 1 Sienkiewicz, J. and Chesneau, L., *Mariner's Guide to the 500-Mb Chart* (Mariners Weather Log, Winter 1995).



Atlantic Hurricane Season of 2005

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Introduction

The 2005 Atlantic hurricane season was the most active on record. Twenty-eight storms formed, including 27 named tropical storms and one unnamed subtropical storm. This broke the old record of 21 set in 1933. Fifteen storms became hurricanes, breaking the old record of 12 set in 1969. Seven of the hurricanes became major hurricanes, Category 3 or higher on the Saffir-Simpson Hurricane Scale, including four (Emily, Katrina, Rita, and Wilma) which reached Category 5 intensity. This is the first time since records began in 1851 that four Category 5 storms have been known to occur in a season. In contrast, based on the last 40 years, in an average season there would have been 11 named storms, 6 hurricanes, and 2 major hurricanes. Wilma had a minimum central pressure of 882 hPa, the lowest ever observed in an Atlantic hurricane. The season also included three depressions—two tropical and one subtropical—that did not reach tropical storm strength.

Seven tropical cyclones made landfall in the United States, including Hurricanes Cindy, Dennis, Katrina, Rita, and Wilma. The latter four were major hurricanes at landfall, and this was the first time that four major hurricanes hit the United States in one season. Katrina was the deadliest U. S. hurricane since the Palm Beach-Lake Okeechobee hurricane of September 1928. It devastated portions of the northern coast of the Gulf of Mexico and is the most costly U. S. hurricane of record. Hurricane Ophelia also struck the United States, although the circulation center stayed just off the coast of North Carolina.

Seven tropical cyclones hit Mexico, including major hurricanes Emily and Wilma. Dennis hit Cuba as a major hurricane, while Hurricane Beta hit the Colombian island of Providencia as well as Nicaragua. Vince made landfall in Spain as a tropical depression, making it the first tropical cyclone on record to hit that country.

Individual Storms

The vital statistics of the named storms of 2005 are given in **Table 1**, while the tracks are shown in **Figure 1**. The tracks of the depressions are shown in **Figure 2**. In the cyclone summaries given, all dates are based

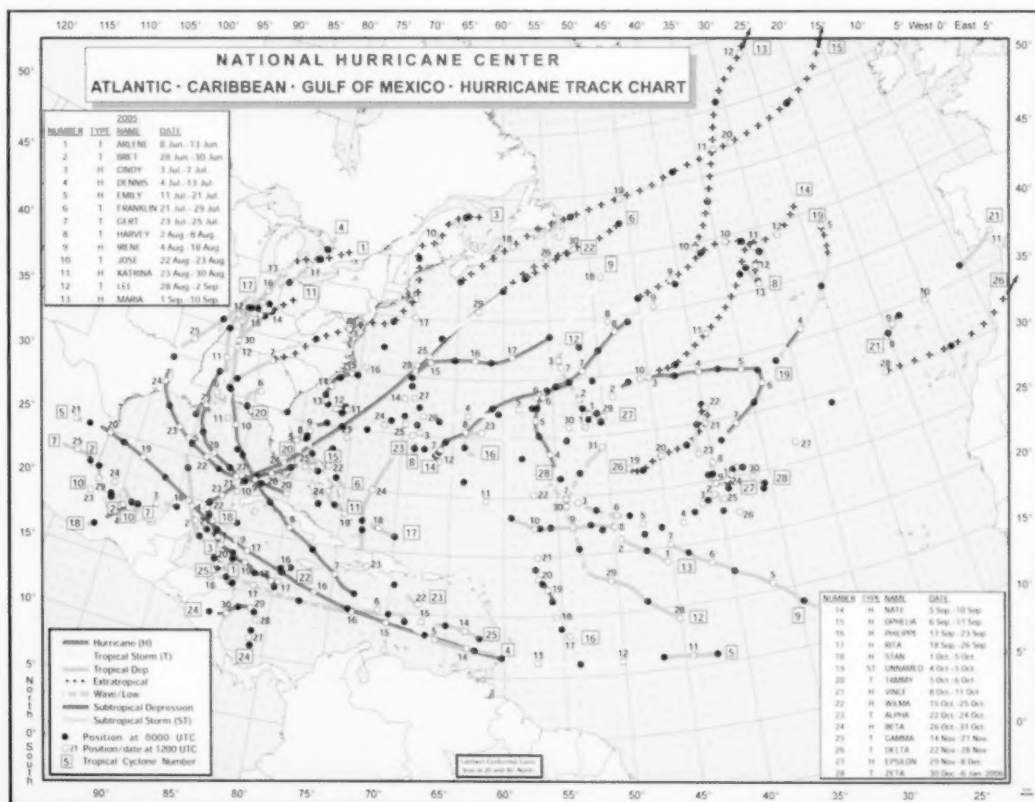


Figure 1. Tracks of Atlantic tropical storms, subtropical storms, and hurricanes of 2005.



Storm Name	Class*	Dates**	Maximum Winds (kt)	Minimum Central Pressure (mb)	Deaths	U. S. Damages (\$million)
Arlene	TS	8-13 June	60	989	1	Minor***
Bret	TS	28-30 June	35	1002	1	
Cindy	H	3-7 July	65	991	1	320
Dennis	H	4-13 July	130	930	42	2,230
Emily	H	11-21 July	140	929	6	Minor***
Franklin	TS	21-29 July	60	997		
Gert	TS	23-25 July	40	1005		
Harvey	TS	2-8 August	55	994		
Irene	H	4-18 August	90	970		
Jose	TS	22-23 August	50	998	6	
Katrina	H	22-30 August	150	902	1200	75,000
Lee	TS	28 August – 2 September	35	1006		
Maria	H	1-10 September	100	962		
Nate	H	5-10 September	80	979		
Ophelia	H	6-17 September	75	976	1	70
Philippe	H	17-24 September	70	985		
Rita	H	18-26 September	155	895	7	10,000
Stan	H	1-5 October	70	977	80	
Unnamed	STS	4-5 October	45	997		
Tammy	TS	5-6 October	45	1001		Minor***
Vince	H	8-11 October	65	988		
Wilma	H	15-25 October	160	882	22	16,800
Alpha	TS	22-24 October	45	998	26	
Beta	H	26-31 October	100	962		
Gamma	TS	14-21 November	45	1002	37	
Delta	TS	22-28 November	60	980		
Epsilon	H	29 November – 8 December	75	981		
Zeta	TS	30 December – 6 January	55	994		

* TS - tropical storm, maximum sustained winds 34-63 kt; STS - subtropical storm, maximum sustained winds 34-63 kt; H - hurricane, maximum sustained winds 64 kt or higher.

** Dates based on UTC time and include tropical depression stage.

*** Only minor damage was reported and the extent of the damage was not quantified.

Table 1. Atlantic tropical storms and hurricanes of 2005.

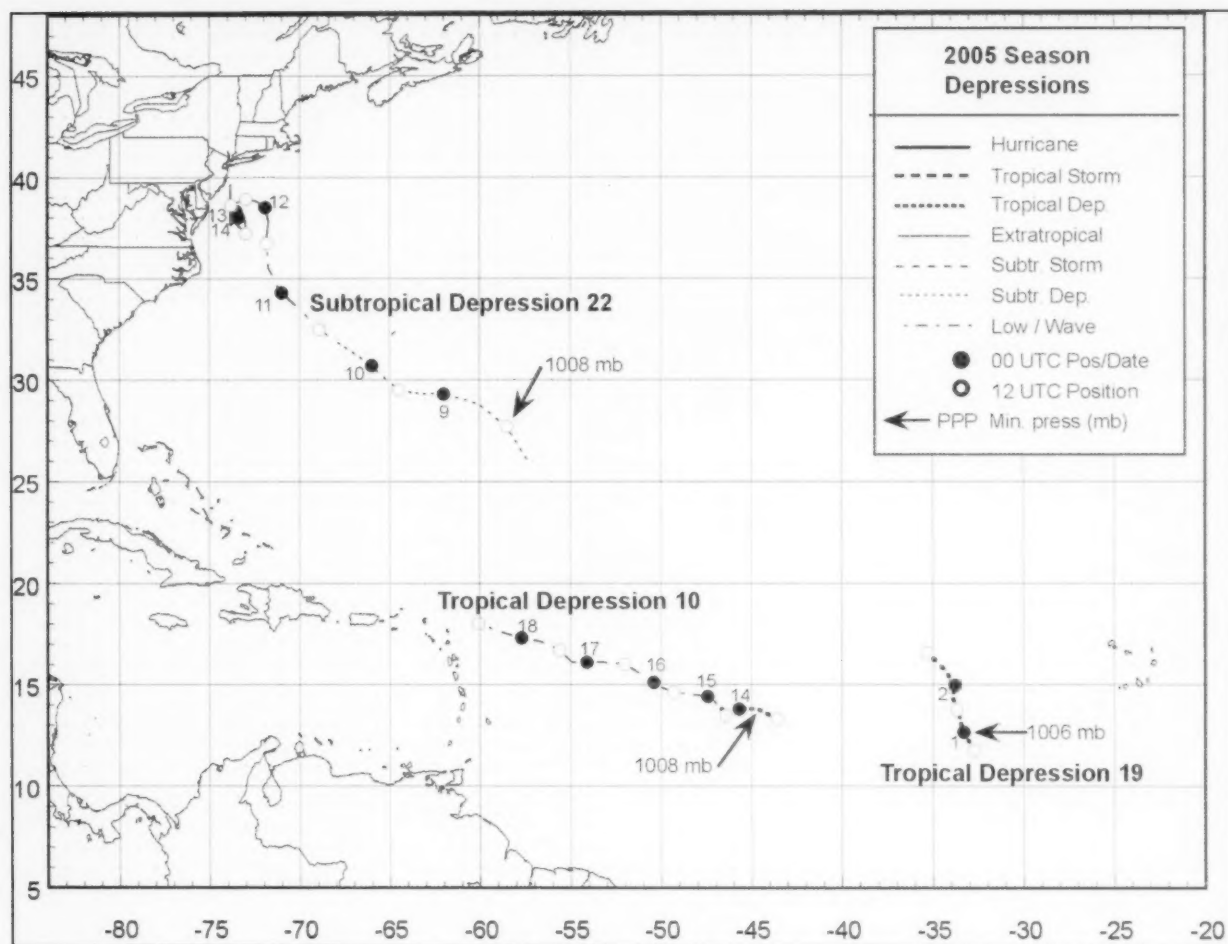


Figure 2. Tracks of Atlantic tropical and subtropical depressions of 2005.

on Universal Coordinated Time, although local time is implied with expressions such as "afternoon," "mid-day," etc.

Tropical Storm Arlene

Arlene formed as a tropical depression on 8 June near the northeastern coast of Honduras from the combination of a tropical wave and the Intertropical Convergence Zone (Figure 1). The depression became a tropical storm on 9 June about 150 nmi west-southwest of Grand Cayman Island. Arlene moved slowly northward with steady intensification and

crossed western Cuba near Cabo Corrientes with 45 kts winds. The storm continued northward over the eastern Gulf of Mexico, where it reached its peak intensity of 60 kts. Thereafter, Arlene weakened, with its center making landfall near Pensacola, Florida on 11 June with 50 kts winds. The cyclone continued to weaken as it moved northward farther inland and was absorbed by a frontal system over southeastern Canada on 14 June.

Arlene's winds affected much of the northwestern Caribbean Sea and the eastern Gulf of Mexico. The most sig-

nificant marine observation was from the **Carnival Glory** (3FPS9), which reported 58 kts winds at 1800 UTC 10 June. The **Carnival Victory** (3FFL8) reported 40 kts winds at 0900 UTC 9 June, an observation that was instrumental in upgrading Arlene to a tropical storm. Other selected ship observations from Arlene are included in Table 2.

At the coast, Punta del Este, on the Isle of Youth, Cuba, reported sustained winds of 41 kts at 0725 UTC 10 June, while Navarre, Florida reported a gust of 52 kts at 1910 UTC 11 June. One student died in a rip cur-



Date/Time (UTC)	Ship name/call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
08 / 2100	Caribbean Princess	19.4	80.7	070 / 35	1004.2
09 / 0900	Carnival Victory	19.4	81.8	140 / 40	1005.0
09 / 1800	Carnival Victory	18.9	81.2	200 / 40	1008.0
10 / 0045	Explorer of the Seas	20.5	85.9	350 / 42	1002.1
10 / 0045	SHIP	20.5	85.9	350 / 42	1002.1
10 / 0700	Fascination (C6FM9)	25.3	79.8	090 / 35	1011.0
10 / 1400	Chevron Arizona	24.5	84.1	120 / 40	1001.3
10 / 1600	OOCL Faith	25.8	87.8	*** / 38	1007.0
10 / 1800	Caribbean Princess	23.1	83.7	220 / 47	1004.2
10 / 1800	Carnival Glory (3FPS9)	24.0	82.3	160 / 58	1004.0
10 / 1800	Chevron Arizona	25.1	83.8	150 / 40	1009.0
10 / 1800	OOCL Faith	25.6	87.1	*** / 35	1004.0
10 / 1900	Holiday (C6FM6)	26.1	87.3	040 / 37	1004.0
10 / 2100	Inspiration (C6FM5)	25.6	84.0	180 / 40	1000.5
10 / 2200	Holiday (C6FM6)	26.2	88.6	040 / 37	1004.0
10 / 2200	Deepwater Millenium	27.7	87.9	060 / 42	1008.0
10 / 2300	Fascination (C6FM9)	25.9	79.7	100 / 35	1011.0
11 / 0000	Inspiration (C6FM5)	26.3	83.5	140 / 51	1004.0
11 / 0000	Overseas New Orleans	27.5	88.7	060 / 38	1006.8
11 / 0100	Holiday (C6FM6)	26.1	89.2	040 / 37	1004.0
11 / 0200	Cajun Express (ELXL3)	28.0	88.1	070 / 40	1005.0
11 / 0400	Cajun Express (ELXL3)	28.0	88.1	060 / 36	1004.0

Table 2. Selected ship reports with winds of at least 34 kts for Tropical Storm Arlene, 8–13 June 2005.

rent triggered by Arlene at Miami Beach, Florida. The storm caused minimal damage.

Tropical Storm Bret

Bret originated from a tropical wave accompanied by a weak area of surface low pressure that crossed Central America and the Yucatan Peninsula of Mexico from 24–27 June. On 28 June, the associated area of disturbed weather became better organized over the Bay of Campeche, and a tropical depression formed the low later that day about 50 nmi northeast of Veracruz, Mexico (*Figure 1*). The cyclone quickly strengthened into a

tropical storm. Bret moved west-northwestward and made landfall on the coast of Mexico near Tuxpan early on 29 June with maximum winds of 35 kts in a very small area near the center. The system dissipated over the mountains of Mexico early on 30 June.

No known ships encountered Bret, and there were no reports of tropical-storm force winds from the affected coastal area. However, Bret produced flooding in the Mexican state of Veracruz, where there was one death in the town of Cerro Azul.

Hurricane Cindy

A tropical wave that left the coast of Africa on 24 June was the origin of Cindy. The wave spawned a depression on 3 July in the Caribbean Sea just east of the Yucatan-Belize border (*Figure 1*). The cyclone moved north-westward across the northeastern Yucatan Peninsula before emerging over the south-central Gulf of Mexico on 4 July. Once over the warm Gulf waters, the depression strengthened into a tropical storm early on 5 July as it turned northward. Additional strengthening occurred, and Cindy became a hurricane with maximum sustained winds of 65 kts a few hours



before making landfall near Grand Isle, Louisiana early on 6 July. Cindy then turned northeastward, its center passing just east of New Orleans, Louisiana before making landfall on the Mississippi coast as a tropical storm later that day. The cyclone continued northeastward across the southeastern United States and merged with a frontal system over northern Georgia on 7 July. The extratropical remnants of Cindy then moved northeastward along the Appalachian Mountains and across New England and southeastern Canada before dissipating over the Gulf of St. Lawrence on 11 July.

Several ships and buoys encountered Cindy (*Table 3*). The most significant observation was from the moveable semi-submersible oil rig **Deepwater Horizon** (V7HC9), which reported a southeast wind of 60 kts at 1700 UTC 5 July (likely at an elevation of 150–300 ft). Additionally, the fixed oil platform **South Timbalier** (ST-308) reported a gust to 87 kts near 1800 UTC 5 July, while a buoy operated by the University of Southern Mississippi reported sustained winds of 43 kts with a gust to 51 kts at 1030 UTC 6 July.

At the coast, an automated platform operated by Louisiana State University reported sustained winds of 67 kts with a gust to 75 kts (elevation 133 ft) at 0100 UTC 6 July. Lakefront Airport in New Orleans reported sustained winds of 47 kts with a gust to 61 kts at 0800 UTC 6 July, while Pascagoula, Mississippi reported sustained winds of 40 kts with a gust to 48 kts at 1025 UTC that day.

Cindy and its remnants caused heavy rains and localized floods across portions of the southeastern United States, with one death in Georgia due to the floods. The storm caused an estimated \$320 million damage in the United States.

Hurricane Dennis

Dennis developed from a tropical wave that moved westward across the coast of Africa on 29 June. A tropical depression formed from the wave on 4 July near the southern Windward Islands (*Figure 1*). The cyclone moved west-northwestward across the eastern and central Caribbean sea, became a tropical storm on 5 July, and strengthened into a hurricane early on 6 July about 215 nmi east-

southeast of Jamaica. Dennis intensified over the next two days, becoming a major hurricane on 7 July and a Category 4 hurricane with winds of 130 kts the next day just south of central Cuba. The core of Dennis passed over Cabo Cruz, Cuba early on 8 July with winds of 115 kts, and then made landfall along the south-central coast of Cuba that afternoon near Cienfuegos with winds of 125 kts (*Figure 3*). After landfall, Dennis passed near Havana and weakened to a Category 1 hurricane before emerging over the southeastern Gulf of Mexico early on 9 July. Although Dennis re-intensified into a Category 4 hurricane with winds of 125 kts early on 10 July over the eastern Gulf of Mexico, it weakened to Category 3 strength before making landfall over the western Florida Panhandle near Navarre Beach late that day. Dennis degenerated to a low pressure area over the Tennessee and Ohio Valleys, and it was eventually absorbed by an extratropical low over southeastern Canada on 18 July.

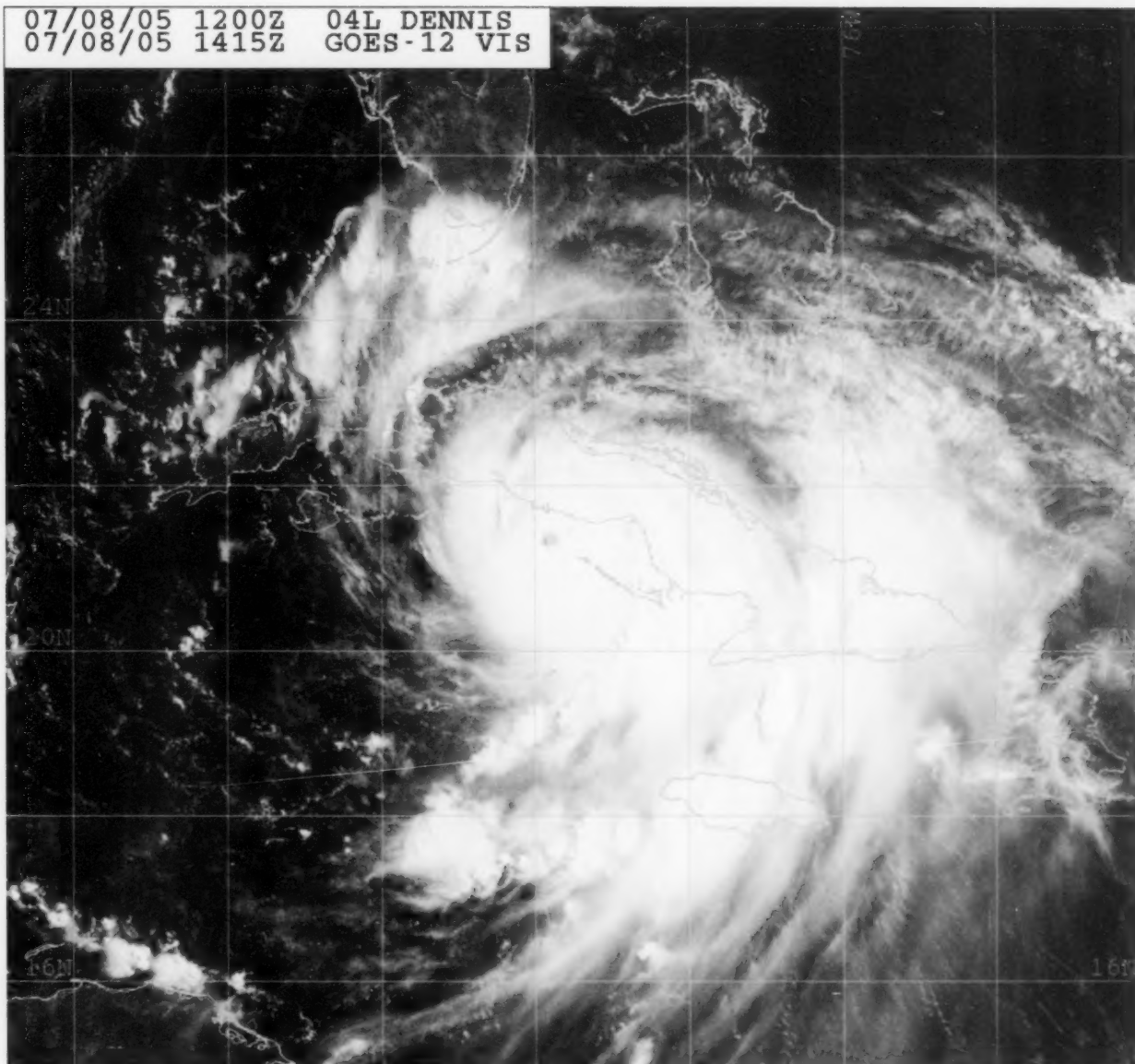
Ships avoided the intense, but small, core of Dennis. The highest marine wind reported was 56 kts at 2300 UTC 8 July from the **Caribbean Princess** (ZCDG8). **Seakeepers**

Date/Time (UTC)	Ship name/call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
05 / 0900	Cajun Express (ELXL3)	28.6	90.0	120 / 35	1015.0
05 / 1000	Lykes Liberator	24.9	88.2	140 / 40	1012.0
05 / 1100	Discoverer Enterprise (V7HD3)	28.2	88.5	150 / 35	1008.0
05 / 1500	Nedlloyd Holland	26.8	89.5	170 / 37	1010.0
05 / 1700	Deepwater Horizon	27.6	89.8	130 / 60	1011.5
05 / 1800	Northern Fortune (V2AW5)	26.0	87.8	040 / 41	1017.0
05 / 1900	Deepwater Horizon	27.5	89.8	150 / 46	1007.7
06 / 0000	Deepwater Millenium	27.7	87.9	150 / 37	1016.0
06 / 0100	Philadelphia	28.5	89.1	140 / 50	1006.5

Table 3. Selected ship reports with winds of at least 34 kts for Hurricane Cindy, 3–7 July 2005.



07/08/05 1200Z 04L DENNIS
07/08/05 1415Z GOES-12 VIS



Naval Research Lab http://www.nrlmry.navy.mil/sat_products.html
<-- Visible (Sun elevation at center is 48 degrees) -->

Figure 3. GOES-12 visible image of Hurricane Dennis near peak intensity at 1415 UTC 8 July 2005.

Image courtesy of the Naval Research Laboratory, Monterey, CA.



(KS049) reported 48 kts winds at 1500 UTC 10 July. Ships that reported winds at least 34 kts for Hurricane Dennis are shown in **Table 4**.

Dennis brought hurricane conditions to many portions of Cuba. Cabo Cruz reported 116 kts sustained winds with a gust to 129 kts at 0200 UTC 8 July, with a minimum pressure of 956 hPa at 0240 UTC just before the eye passed over the station. The anemometer was destroyed, and it is possible more extreme winds occurred there. Dennis also caused hurricane conditions in the western Florida Panhandle. An instrumented tower operated by the Florida Coastal Monitoring Program (FCMP) at Navarre measured 1-min average winds (5 m elevation) of 86 kts and a gust to 105 kts at 1921 UTC 10 July.

Dennis was responsible for 42 deaths—22 in Haiti, 16 in Cuba, 3 in the United States, and 1 in Jamaica. The hurricane caused considerable damage across central and eastern Cuba as well as the western Florida Panhandle, including widespread utility and communications outages.

Considerable storm surge-related damage also occurred near St. Marks, Florida, approximately 150 nmi east of the landfall location. The damage associated with Dennis in the United States is estimated at \$2.23 billion. Damage in Jamaica is estimated at 1.9 billion Jamaican dollars (approximately \$31.7 million U. S. dollars).

Hurricane Emily

Emily originated from a tropical wave that moved westward from the coast of Africa on 6 July. A tropical depression developed on 11 July about 1075 nmi east of the southern Windward Islands. Moving westward, the depression became a tropical storm the following day. Emily became a hurricane early on 14 July several hours before the center crossed Grenada. Later that day, Emily reached major hurricane strength over the eastern Caribbean Sea. Over the next few days, it moved west-northwestward across the Caribbean, reaching a peak intensity of 140 kts on 17 July (the earliest Category 5 hurricane on record) when it was south of Hispaniola (**Figure 4**). Emily passed

south of Jamaica and the Cayman Islands, and it struck the Yucatan Peninsula near Tulum on 18 July with maximum winds near 115 kts (Category 4). Emily weakened while crossing the Yucatan, but it became a major hurricane again in the southwestern Gulf of Mexico on 19 July. Emily made its final landfall the next day near San Fernando, Mexico, with maximum sustained winds near 110 kts (Category 3). The cyclone then weakened and dissipated on 21 July over northern Mexico.

NOAA buoy 42056 reported 1-min average winds of 63 kts with a gust to 74 kts at 2151 UTC 17 July. Additionally, three ships reported tropical storm-force winds from Emily, with highest winds of 50 kts coming from the **Santa Clara** (ELQJ3) at 0000 UTC 20 July. The **Overseas New Orleans** (WFKW) reported 39 kts winds at 1800 UTC 19 July, while the **Mathilde Maersk** (OUUU2) reported 37 kts winds at 2100 UTC 16 July.

Emily brought hurricane conditions and caused property damage in

Date/Time (UTC)	Ship name/call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
07 / 1800	UBC Stavanger	15.3	76.8	260 / 43	N/A
07 / 1800	Lombok Strait	18.3	74.9	160 / 41	1007.0
08 / 2300	Caribbean Princess	24.9	79.8	110 / 56	1008.1
09 / 0000	Fascination (C6FM9)	26.0	79.6	100 / 35	1012.0
09 / 1800	Sealand Florida	23.6	82.6	190 / 37	1003.8
09 / 2000	Julius Hammer	23.6	82.4	160 / 37	1007.0
09 / 2100	Sealand Florida	23.8	81.6	140 / 40	1006.6
10 / 0530	Explorer of the Seas	26.3	79.2	120 / 44	1012.5
10 / 0600	Sea Horse	25.3	80.0	140 / 35	1019.0
10 / 0600	Seakeepers (KS049)	25.9	83.3	160 / 39	999.9
10 / 0600	Carnival Glory	26.5	78.9	140 / 40	1015.0
10 / 0657	Explorer of the Seas	26.0	79.6	100 / 41	1012.0
10 / 1500	Seakeepers (KS049)	27.6	83.2	190 / 48	1001.8
13 / 2200	Canadian Enterprise	42.0	81.5	130 / 40	N/A

Table 4. Selected ship reports with winds of at least 34 kts for Hurricane Dennis, 4–13 July 2005.

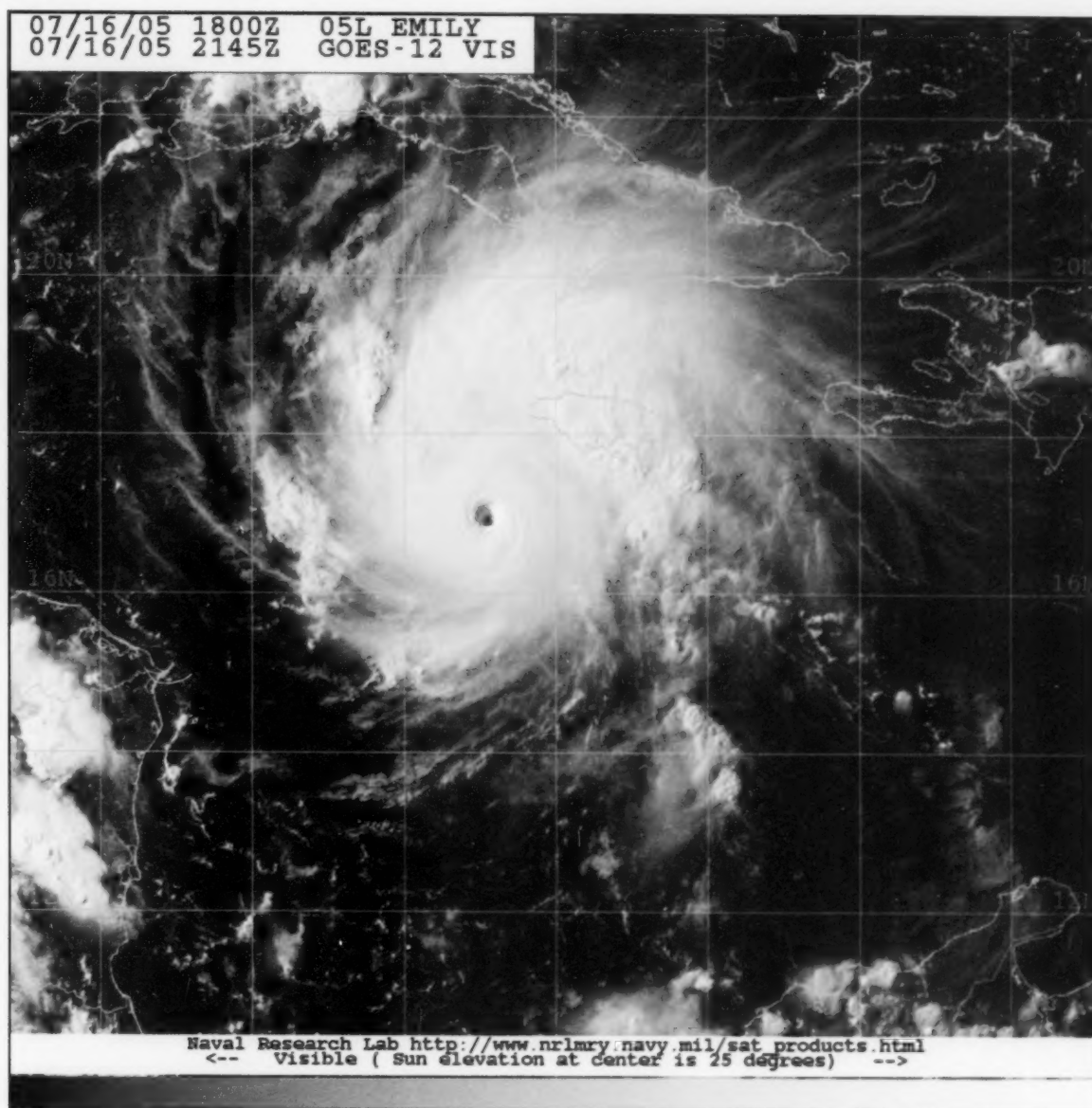


Figure 4. GOES-12 visible image of Hurricane Emily near peak intensity at 2145 UTC 16 July 2005.

Image courtesy of the Naval Research Laboratory, Monterey, CA.

Grenada, the northeastern Yucatan, and portions of northeastern Mexico. The cyclone also produced tropical storm conditions in south Texas. Emily was responsible for six deaths—one in Grenada and five in Jamaica.

Tropical Storm Franklin

Franklin formed from a tropical wave that emerged from the coast of Africa on 10 July. It started as a tropical depression on 21 July about 60 nmi east of the island of Eleuthera in the northwestern Bahamas, and it became a tropical storm late that day. Franklin

turned northward and then northeastward during the next two days while strengthening to its peak intensity of 60 kts on 23 July. During 23–26 July, Franklin moved erratically east-northeastward in the general direction of Bermuda, with winds weakening to 35 kts by 25 July due to northwesterly



wind shear. The storm center passed about 175 nmi west of Bermuda on 26 July. Franklin then moved slowly northward on 27–28 July while it re-intensified to 50 kts. Later on 28 July, Franklin accelerated northeastward in response to a frontal system moving off the east coast of the United States. The cyclone weakened north of the Gulf Stream early on 29 July, became extratropical late that day, and merged with a frontal zone while passing south of Newfoundland on 30–31 July.

Two ships reported tropical storm-force winds from Franklin while it was a tropical cyclone. The **Alkin Kalkavan** (V7GY3) reported 50 kts winds at 2100 UTC 29 August as Franklin was becoming extratropical, while the **Liberty Sun** (WCOB) reported 37 kts winds at 0900 UTC 25 August. Tropical storm-force winds associated with Franklin stayed east of the Bahamas, and there were no reports of casualties or damages from the storm.

Tropical Storm Gert

Gert formed from the same tropical wave that spawned Tropical Storm Franklin. The system developed into a tropical depression in the Bay of Campeche on 23 July, and it strengthened to a tropical storm later that day while moving slowly west-northwestward (**Figure 1**). Gert made landfall just north of Cabo Rojo, Mexico late on 24 July with 40 kts winds. The storm dissipated over central Mexico the next day. The cyclone brought locally heavy rain to areas that had been affected by Hurricane Emily less than a week earlier, but there were no reports of casualties or damages from Gert.

Tropical Storm Harvey

Harvey formed from a tropical wave that exited the coast of Africa on 22 July. This wave showed signs of organization during its passage across the tropical Atlantic. The system reached the northeastern Caribbean Sea on 29 July, with an associated area of disturbed weather crossing Hispaniola on 30 July. The disturbance moved northward for a couple of days and became organized into a tropical depression on 2 August about 320 nmi southwest of Bermuda. Moving north-northeastward, the cyclone strengthened into Tropical Storm Harvey on 3 August. The next day, Harvey turned toward the east-northeast and reached its peak intensity of 55 kts. The storm drifted northward on 6 August and then turned northeastward the next day in response to an upper-level trough approaching from the west. Harvey became a large and powerful extratropical cyclone late on 8 August about 490 nmi southeast of Cape Race, Newfoundland, which lingered over the North Atlantic until losing its identity on 14 August.

One ship reported tropical storm-force winds from Harvey—the **Fortune Pioneer I** (H3VT), which reported 35 kts winds while located about 125 nmi south-southeast of the circulation center at 1200 UTC 3 August. Bermuda reported sustained winds of 32 kts with a gust to 44 kts as Harvey passed about 40 nmi to the south on 4 August. There were no reports of casualties or damages due to Harvey.

Hurricane Irene

Irene formed from a tropical wave that moved off the coast of Africa on 1 August. It developed into a depres-

sion on 4 August about 600 nmi southwest of the Cape Verde Islands, but promptly turned northwestward across cooler waters (**Figure 1**). This halted further development until 7 August, when the depression strengthened to a tropical storm about 1080 nmi east of the northern Leeward Islands. Irene moved over the open waters of the central tropical Atlantic for the next few days, weakening to a tropical depression before re-strengthening to a tropical storm on 11 August. Irene turned northwestward and passed between Bermuda and Cape Hatteras, North Carolina on 14 August. The cyclone then turned north-northeastward and strengthened into a hurricane, reaching its peak intensity of 90 kts on 16 August. This was followed by an eastward turn and weakening. Irene then moved east-northeastward over much cooler waters and was absorbed by an extratropical low about 250 nmi east-southeast of Cape Race on 18 August. There were no reports of casualties or damages due to Irene.

Tropical Storm Jose

The short-lived Jose originated from a tropical wave that moved westward from the coast of Africa on 8 August. A tropical depression formed from the wave on 22 August over the Bay of Campeche about 95 nmi east of Veracruz, with the depression becoming a tropical storm later that day (**Figure 1**). Maximum winds reached 50 kts as Jose made landfall early on 23 August about 30 nmi north of Veracruz. Shortly thereafter, the cyclone dissipated over the mountains of eastern Mexico. Jose produced locally heavy rains over portions of eastern Mexico, resulting in mud slides that caused six deaths.



Hurricane Katrina

Katrina was one of the most devastating hurricanes in the history of the United States, and it was the deadliest hurricane to strike the United States since the Palm Beach-Lake Okeechobee hurricane of September 1928. It produced catastrophic damage—estimated at \$75 billion in the New Orleans area and along the Mississippi coast—and is the costliest U. S. hurricane on record.

This horrific tropical cyclone formed from the combination of a tropical wave, an upper-level trough, and the mid-level remnants of Tropical Depression Ten. These systems produced disturbed weather over the southeastern Bahamas on 22 August, and a tropical depression formed the next day about 175 nmi southeast of Nassau in the Bahamas (*Figure 1*). Moving northwestward, it became a tropical storm on 24 August about 65 nmi east-southeast of Nassau. Katrina passed through the northwestern

Bahamas on 24–25 August and then turned westward toward southern Florida. It became a hurricane just before the center made landfall near the Miami-Dade/Broward county line during the evening of 25 August.

Katrina moved southwestward across southern Florida into the eastern Gulf of Mexico on 26 August, then it turned west-northwestward on 27 August. It strengthened significantly, reaching Category 5 intensity on 28 August (*Figure 5*) while turning

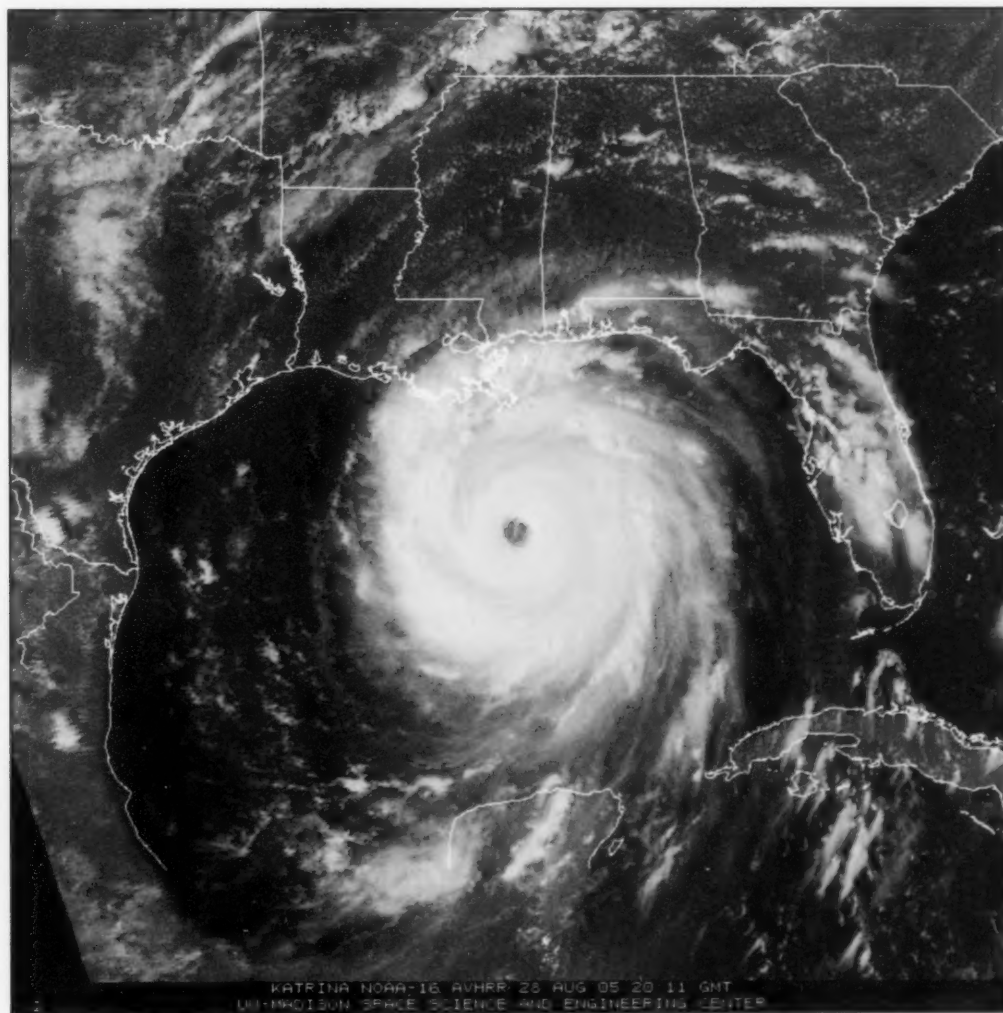


Figure 5. NOAA-16 multispectral image of Hurricane Katrina near peak intensity at 2005, UTC 28 August 2005.

Image courtesy of the Space Science and Engineering Center, University of Wisconsin, Madison, WI



northward. Later that day, maximum sustained winds reached 150 kts with an aircraft-measured central pressure of 902 hPa while the eye was about 170 nmi southeast of the mouth of the Mississippi River. This center reached the Louisiana coast near Buras at 1110 UTC 29 August with maximum winds estimated at 110 kts (Category 3). Continuing northward, the hurricane made a second landfall near the Louisiana/Mississippi border at 1445 UTC with maximum winds estimated at 105 kts (Category 3). Katrina weakened while moving north-northeastward over land, but it was still a hurricane as far inland as Laurel, Mississippi. The cyclone weakened to a tropical depression over the Tennessee Valley on 30 August. Katrina became an extratropical low on August 31 and was absorbed by a frontal zone later that day over the eastern Great Lakes.

Many ships encountered Katrina (**Table 5**), although none were in the intense inner core. The **Malcom Baldrige** (WTER) reported 55 kts winds at 1500 UTC 26 August, while the **Cajun Express** (ELXL3) reported 55 kts winds at 0000 UTC 29 August. Additionally, NOAA buoy 42003 reported 10-minute average winds of 57 kts with a gust to 78 kts at 0230 UTC 28 August. Several data buoys were casualties of Katrina, with buoy 42003 capsizing and NOAA buoy 42007 reportedly washing ashore.

Katrina brought hurricane conditions to southeastern Louisiana, southern Mississippi, and southwestern Alabama. The Coastal Marine Automated Network (C-MAN) station at Grand Isle, Louisiana reported sustained winds of 76 kts at 0820 UTC 29 August with a gust to 99 kts. Higher winds likely occurred there and elsewhere, as it and many other stations either were destroyed, lost

power, or lost communications during the storm. Storm surge of 25 to 28 ft above normal tide level occurred along portions of the Mississippi coast, with storm surge of 10 to 20 ft above normal tide levels along the southeastern Louisiana coast. Hurricane conditions also occurred over southern Florida and the Dry Tortugas. The National Hurricane Center/Miami Weather Forecast Office reported sustained winds of 60 kts at 0115 UTC 26 August with a gust to 76 kts. Additionally, tropical storm conditions occurred along the northern Gulf coast as far east as the coast of the western Florida Panhandle, as well as in the Florida Keys.

Katrina is directly responsible for approximately 1200 deaths, including about 1000 in Louisiana and 200 in Mississippi. Seven additional deaths occurred in southern Florida. Katrina caused catastrophic damage in southeastern Louisiana and southern Mississippi. Storm surge along the Mississippi coast caused total destruction of many structures, with the surge damage extending several nautical miles inland. Similar damage occurred in portions of southeastern Louisiana southeast of New Orleans. The surge overtopped and breached some levees in the New Orleans metropolitan area, resulting in the inundation of much of the city and its eastern suburbs. Wind damage from Katrina extended well inland into northern Mississippi and Alabama. The hurricane also caused wind and water damage in Miami-Dade and Broward counties.

Tropical Storm Lee

Tropical Storm Lee formed from a tropical wave that moved westward from Africa on 24 August. It first became a depression on 28 August

about midway between Africa and the Lesser Antilles (**Figure 1**). The depression dissipated the following day, but its remnants redeveloped into a depression on 31 August. The cyclone briefly became a tropical storm later that day. It then degenerated and became a remnant low pressure area on 2 September about 625 nmi east of Bermuda. The low was absorbed by a cold front late on 3 September. There were no reports of casualties or damages from Lee.

Hurricane Maria

Maria developed from a vigorous tropical wave that crossed the west coast of Africa on 27 August and became a tropical depression on 1 September while centered about 910 nmi east of the northern Leeward Islands (**Figure 1**). Moving west-northwestward to northwestward, the cyclone strengthened into a tropical storm the next day. Maria turned north-northwestward and became a hurricane on 4 September. It reached an estimated peak intensity of 100 kts early on 6 September (**Figure 6**) when the cyclone was centered about 415 nmi east of Bermuda. Over the next few days, Maria moved northeastward while the intensity slowly decreased, with the cyclone weakening to a tropical storm early on 9 September. Maria became a powerful extratropical storm over the north Atlantic about 660 nmi east of Cape Race on 10 September. The storm moved past Iceland on 13 September and merged with another extratropical low the next day. This system caused a landslide and one death in Norway.

Three ships reported tropical storm-force winds from Maria. The **Faust** (WRYX) reported 37 kts winds at 0500 UTC 10 September, while the **Marinus Green** (PECS) reported 37 kts winds at 1200 UTC 7 September.



Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
25 / 1800	Frances L (ZCAM5)	26.8	79.3	080 / 37	1005.5
26 / 0600	Jacksonville	24.5	80.3	190 / 45	1005.0
26 / 0600	Malcom Baldrige	24.6	81.8	260 / 40	999.3
26 / 0600	Philadelphia (KSYP)	24.8	80.4	180 / 36	1004.5
26 / 1200	Asphalt Commander	24.0	81.8	250 / 37	1003.0
26 / 1500	Malcom Baldrige	24.6	81.8	200 / 55	1000.8
26 / 2100	Fascination (C6FM9)	24.4	80.4	180 / 40	1007.0
27 / 0000	Sol De Brasil	24.1	82.0	180 / 37	1000.5
27 / 0600	Rickmers Tokyo	22.8	84.3	240 / 45	999.0
27 / 1200	Seakeepers (KS049)	22.7	84.5	240 / 36	994.1
27 / 1800	Carnival Valor (H3VR)	23.2	83.3	190 / 40	1001.0
27 / 1800	Seakeepers (KS049)	23.5	82.6	160 / 41	994.5
27 / 1800	Sol De Brasil	25.5	83.1	120 / 37	1003.5
27 / 2100	Delaware Trader (WDB325)	23.8	86.8	340 / 38	995.2
28 / 0000	Jo Syress	21.1	84.4	200 / 35	1005.5
28 / 0600	Lykes Discoverer	23.0	84.5	170 / 44	1001.2
28 / 0600	Delaware Trader (WDB325)	23.7	84.7	190 / 54	999.5
28 / 0800	Discoverer Enterprise (V7HD3)	27.6	92.1	000 / 35	994.0
28 / 1200	Lykes Discoverer	23.0	85.9	190 / 44	999.5
28 / 1200	Jo Syress	23.0	85.7	200 / 37	1001.9
28 / 1200	Joint Frost	27.6	83.0	130 / 35	1007.3
28 / 1400	Jag Prakash	24.0	88.3	250 / 37	1000.0
28 / 1500	Deepwater Millenium	27.1	91.6	010 / 40	1003.0
28 / 1800	Richard H. Matzke	23.8	87.0	200 / 36	1004.5
28 / 1800	British Excellence (MCLQ4)	26.0	84.9	180 / 42	1005.0
28 / 1800	Discoverer Spirit	27.5	90.6	020 / 40	998.0
28 / 2100	Lykes Discoverer	23.5	88.2	240 / 37	998.5
28 / 2100	Discoverer Deep Seas	26.2	91.4	350 / 35	993.0
29 / 0000	Bernardo Quintana A	24.9	89.4	240 / 38	994.5
29 / 0000	Discoverer Deep Seas	26.2	91.4	320 / 40	993.1
29 / 0000	Cajun Express (ELXL3)	26.6	90.9	310 / 55	990.0
29 / 0000	Ocean Confidence (V7EA2)	26.8	91.7	340 / 44	986.8
29 / 0000	Deepwater Millenium	27.0	92.7	350 / 40	1001.0
29 / 0200	Indotrans Flores (VRZN8)	26.5	92.7	350 / 54	997.0
29 / 0300	Bernardo Quintana A	25.2	89.7	220 / 38	995.7
29 / 0300	Cajun Express (ELXL3)	26.5	90.8	310 / 52	991.0
29 / 0300	Ocean Confidence (V7EA2)	26.8	91.7	320 / 44	988.2
29 / 0400	Discoverer Spirit	27.1	91.4	350 / 40	996.0
29 / 0500	Indotrans Flores (VRZN8)	26.4	92.2	330 / 54	996.0
29 / 0600	Bernardo Quintana A	25.5	90.0	220 / 38	997.0
29 / 0600	Deepwater Horizon	27.0	92.7	340 / 37	998.3
29 / 0800	Deepwater Horizon	27.0	92.7	320 / 38	998.6
29 / 0900	Indotrans Flores (VRZN8)	26.3	91.4	330 / 54	995.0
29 / 1100	Sensation (C6FM8)	22.3	88.0	230 / 35	1009.0
29 / 1200	British Excellence (MCLQ4)	28.3	85.5	170 / 36	1004.3
29 / 1500	Indotrans Flores (VRZN8)	26.9	90.7	270 / 54	999.0

Table 5. Selected ship reports with winds of at least 34 kts for Hurricane Katrina, 23–30 August 2005.

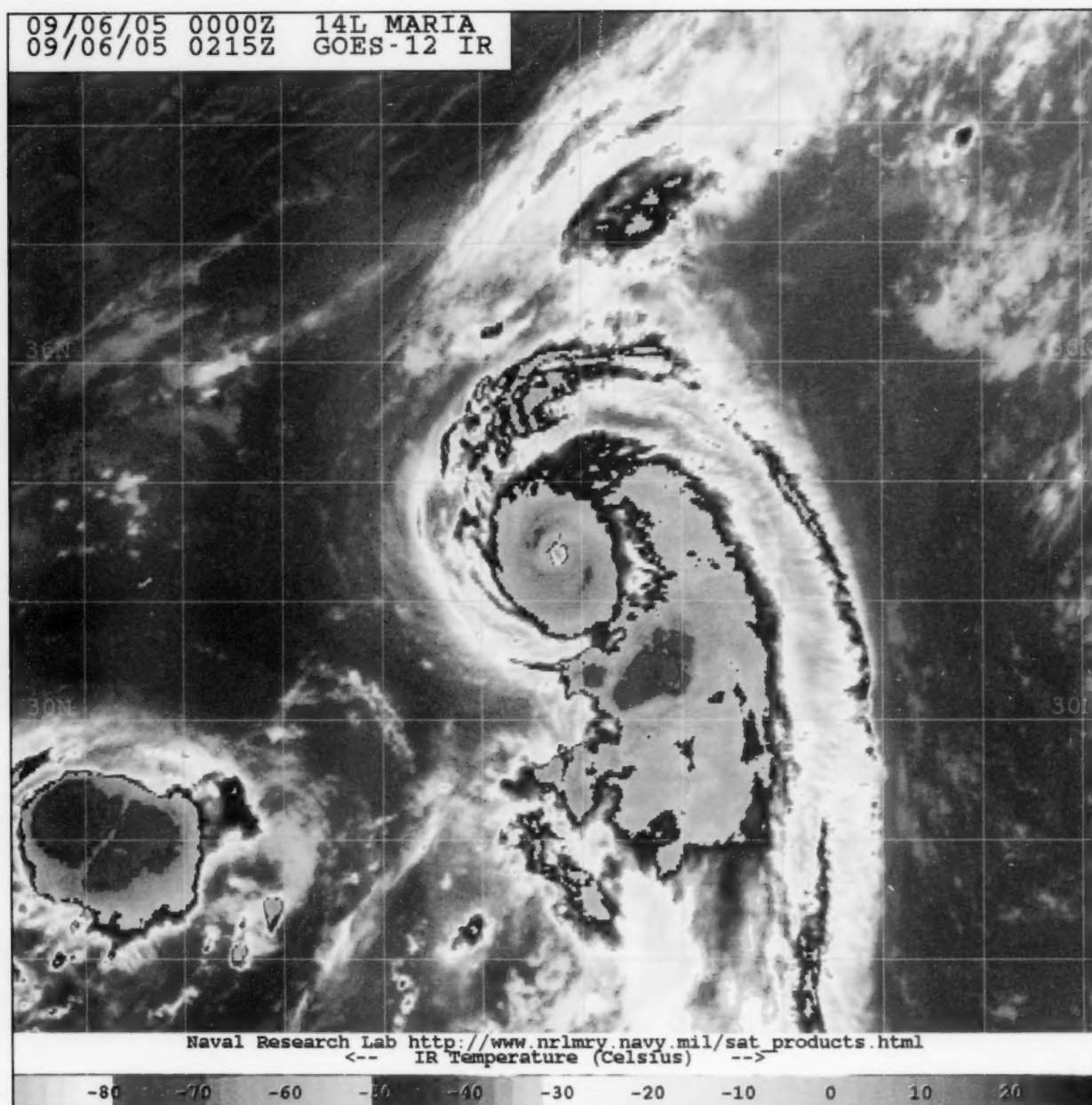


Figure 6. GOES-12 infrared image of Hurricane Maria at 0215 UTC 6 September 2005.

Image courtesy of the Naval Research Laboratory, Monterey, CA



Additionally, the **CMA CGM Potomac** (HP11) reported 36 kts winds at 0000 UTC 9 September.

Hurricane Nate

Nate's origin was the northern portion of a tropical wave that exited the coast of Africa on 30 August. The wave interacted with a weak upper-level trough near Bermuda, causing a tropical depression to develop late on 5 September about 305 nmi south-southwest of Bermuda. The depression strengthened into a tropical storm just six hours later (*Figure 1*). Nate drifted northeastward for the next two days and intensified into a hurricane on 7 September about 225 nmi south-southwest of Bermuda. Early on 8 September, the hurricane accelerated east-northeastward and its center passed about 110 nmi southeast of Bermuda. Vertical wind shear increased as a frontal system approached, and Nate weakened back to a tropical storm on 9 September. The cyclone became extratropical on 10 September about 700 nmi west of the Azores. The extratropical remnants of Nate continued quickly east-northeastward, eventually being absorbed by a larger extratropical system late on 12 September.

Two ships reported tropical storm-force winds from Nate. The **Maersk New Orleans** (ELZY3) reported an east-northeast wind of 41 kts at 1200 UTC 8 September, and the **Strong Patriot** (WCZ858) reported a south-southwest wind of 35 kts at 0600 UTC 10 September. That same day, Bermuda observed a 2-minute average easterly wind of 30 kts at 1130 UTC, followed by a gust to 42 kts at 1525 UTC. There were no reports of casualties or damages due to Nate.

Hurricane Ophelia

Erratic Ophelia originated from an area of disturbed weather at the western end of an old frontal system. The cyclone began becoming organized on 4 September over the central and northwestern Bahamas, and a tropical depression formed on 6 September near Grand Bahama Island (*Figure 1*). The depression moved erratically north-northwestward and became a tropical storm on 7 September. Ophelia meandered off the central Florida coast for the next two days, briefly reaching hurricane strength on 8 September. Ophelia moved northeastward late on 9 September, and this motion continued until it again stalled on 11 September about 205 nmi south of Cape Hatteras, North Carolina. During that time, maximum sustained winds fluctuated between 55 and 75 kts. Ophelia made a slow loop on 12–13 September, moving southwestward and then northwestward before beginning a northward motion toward the North Carolina coast. Maximum sustained winds again reached 75 kts by the time the northern eyewall reached the North Carolina coast near Cape Fear on 14 September. Ophelia turned slowly east-northeastward, with the center passing south of Cape Lookout and Cape Hatteras the next day. It then weakened to a tropical storm early on 16 September about 40 nmi south-southeast of Cape Hatteras. Acceleration toward the northeast on 16 September brought the center east of Cape Cod the next day. Ophelia became an extratropical low near Nova Scotia early on 18 September, passed over Newfoundland on 19 September, and reached the eastern Atlantic on 21 September. The extratropical remnants of Ophelia dissipated over the North Sea on 23 September.

Many ships reported tropical-storm force winds from Ophelia (*Table 6*). The most noteworthy observations include a report of 64 kts winds from the **MOL Americas** (V2EX) at 0000 UTC 15 September, and a report of 62 kts winds from the **Maersk New Orleans** at 0600 UTC 14 September. NOAA buoy 41025 reported 10-minute average winds of 55 kts with a gust to 73 kts at 1707 UTC 15 September, while NOAA buoy 41013 reported a pressure of 980.8 hPa from the eye of Ophelia at 1000 UTC 14 September.

Ophelia brought hurricane conditions to portions of the North Carolina coast. The strongest reported winds were from the C-MAN station at Cape Lookout, which reported 2-min average winds of 65 kts at 2309 UTC 14 September with a gust to 80 kts. The National Ocean Service (NOS) station at Wrightsville Beach reported 6-min average winds of 59 kts at 1700 UTC 14 September with a gust of 69 kts. Ophelia also brought tropical storm conditions to portions of the east coast of Florida.

One death was attributed to Ophelia—a drowning along the southeastern coast of Florida. The storm caused an estimated \$70 million of damage in the United States, along with significant beach erosion noted from the North Carolina coast southward to the east-central Florida coast.

Hurricane Philippe

The origin of Philippe was a tropical wave that moved westward from Africa on 9 September. A tropical depression formed from the wave on 17 September about 300 nmi east of Barbados, with the depression becoming a tropical storm later that day (*Figure 1*). Philippe moved north-



Date/Time (UTC)	Ship name/call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
07 / 0100	Lykes Liberator	32.6	79.3	060 / 36	1016.5
07 / 1000	CSX Discovery	29.6	79.8	040 / 37	1008.0
07 / 1100	CSX Discovery	29.3	79.4	060 / 37	1006.0
07 / 1200	P&O Nedlloyd Marseille	33.3	76.8	090 / 38	1018.4
07 / 1800	DSR Port Said	33.5	77.2	040 / 35	1018.5
08 / 0600	Leverkusen Express	28.9	77.4	130 / 35	1010.0
08 / 1200	Madison Maersk	31.0	78.8	050 / 39	1013.0
08 / 1600	Asphalt Commander	29.5	77.5	190 / 50	1006.0
09 / 0000	CSX Producer	28.6	79.0	170 / 60	995.5
09 / 1100	Lykes Navigator	30.9	78.7	040 / 43	1007.0
09 / 1200	Lykes Navigator	31.2	78.7	030 / 44	1018.5
09 / 1800	Paris Express	31.9	79.9	020 / 41	1011.0
09 / 2100	Tourcoing (9V6488)	30.0	80.6	010 / 35	1010.0
09 / 2300	Bonn Express	30.4	76.9	130 / 45	1001.8
10 / 1800	Star Istind	32.8	76.2	050 / 44	1009.0
10 / 1800	Singapore Bay	33.7	74.8	090 / 40	1010.6
10 / 2100	Green Dale	33.7	77.0	040 / 40	1013.0
10 / 2200	Singapore Bay	32.2	74.8	260 / 39	1003.4
11 / 1700	Fortune Pioneer I	34.3	71.3	080 / 44	1021.0
11 / 2100	Jens Maersk	29.6	75.1	230 / 40	1010.5
11 / 2100	OOCL Freedom	33.6	77.1	030 / 47	1013.0
12 / 0600	Shanghai Express	29.9	78.4	320 / 35	1011.8
12 / 0600	Frances L (ZCAM5)	31.5	74.6	130 / 37	1009.5
12 / 1800	Sealand Performance	33.6	77.2	080 / 43	1007.5
12 / 2100	Sealand Performance	34.1	76.6	090 / 42	999.8
13 / 0000	Overseas New Orleans	33.1	78.1	050 / 45	1005.2
13 / 0600	Sealand Liberator	31.5	77.4	200 / 50	994.0
13 / 1800	OOCL Freedom	33.7	77.0	120 / 35	1007.5
14 / 0000	Livorno Express (WABU)	31.1	77.2	230 / 37	1006.4
14 / 0600	Montebello	31.4	77.7	240 / 51	1003.0
14 / 0600	Maersk New Orleans	32.4	76.5	160 / 62	1003.0
15 / 0000	Sanmar	34.5	75.3	150 / 64	1004.5
15 / 0300	Sanmar	34.3	75.2	210 / 51	1004.0
15 / 1200	Jens Maersk	32.8	74.5	180 / 35	1011.1
15 / 1500	SHIP	33.5	75.5	210 / 51	1007.0
16 / 0000	CMA CGM Potomac (HP11)	33.4	73.3	190 / 40	
17 / 0000	Sandon (ZDGR8)	33.3	72.7	190 / 45	1015.6
17 / 0600	Tyco Decisive (V7D17)	36.2	69.6	210 / 36	1016.2
17 / 1800	Afhankelijk	40.9	65.7	190 / 45	1003.6
17 / 1900	German Senator	41.8	62.1	260 / 37	

Table 6. Selected ship reports with winds of at least 34 kts for Hurricane Ophelia 6-17 September



northwestward to the east of the Lesser Antilles and strengthened, becoming a hurricane on 19 September when the center was about 315 nmi east of the northern Leeward Islands. Philippe reached its peak intensity of 70 kts early on 20 September, then weakened to a tropical storm the next day as vertical wind shear increased. The cyclone turned northward on 21 September while becoming embedded within a larger non-tropical area of low pressure. Rotating counter-clockwise within the larger low, Philippe turned westward and southward during the ensuing 48 hours as it weakened to a tropical depression. The circulation of Philippe was absorbed by the non-tropical low early on 24 September. There were no reports of casualties or damages due to Philippe, and there were no reliable reports of tropical-storm force winds.

Hurricane Rita

Rita, the third Category 5 hurricane of the season, was a destructive and deadly hurricane that devastated portions of southeastern Texas and southwestern Louisiana and significantly impacted the Florida Keys.

A tropical wave and the remnants of an old front combined to produce an area of disturbed weather northeast of Puerto Rico on 16 September. This system became a depression just east of the Turks and Caicos Islands late on 17 September and moved westward, becoming a tropical storm the following afternoon. Maximum sustained winds increased to 60 kts as Rita moved through the central Bahamas on 19 September. While the storm did not strengthen during the following night, rapid intensification began on 20 September as Rita moved through the Straits of Florida. Rita became a hurricane that day and

reached Category 2 intensity while the center passed about 45 nmi south of Key West, Florida.

After entering the Gulf of Mexico, Rita intensified from Category 2 to Category 5 in about 24 hours. Maximum sustained winds reached 145 kts late on 21 September (*Figure 7*), and the hurricane reached a peak intensity of 155 kts early on 22 September. Weakening began later that day and continued through landfall around 0740 UTC 24 September just east of the Texas/Louisiana border between Sabine Pass and Johnson's Bayou. At that time, maximum sustained winds were near 100 kts (Category 3). Weakening continued after landfall, but Rita remained a tropical storm until reaching northwestern Louisiana late on 24 September. The cyclone then turned northeastward and merged with a frontal system two days later.

The eye of Rita scored a direct hit on NOAA buoy 42001, which reported 10-min average winds of 88 kts with a gust to 119 kts at 0030 UTC 23 September. The buoy also reported a minimum pressure of 925.7 hPa at 2300 UTC 22 September. The *Carnival Glory* (3FPS9) reported 54 kts winds at 0900 UTC 19 September. Other ship reports from Rita are included in *Table 7*.

Rita brought hurricane conditions to southwestern Louisiana and southeastern Texas. The FCMP instrumented tower at Port Arthur reported 1-min average winds of 82 kts at 0826 UTC 24 September along with a gust of 101 kts. The C-MAN station at Sea Rim State Park, Texas reported 2-minute average winds of 71 kts at 0700 UTC 24 September, along with a peak gust of 86 kts. The hurricane caused a storm-surge of 10 to 15 ft above normal tide levels along the

southwestern coast of Louisiana, a notable surge on the inland Lake Livingston, Texas, and inundated portions of the New Orleans area previously flooded by Katrina. Tropical storm conditions occurred in the Florida Keys, where the C-MAN station at Sand Key reported 10-minute average winds of 63 kts at 2110 UTC 20 September with a gust to 80 kts; this station failed shortly thereafter. A storm surge of up to 5 ft above normal tide levels occurred in the Keys.

Devastating storm surge and wind damage occurred in southwestern Louisiana and extreme southeastern Texas, with some surge damage occurring in the Florida Keys. Rita was responsible for seven deaths and damage estimated at \$10 billion in the United States.

Hurricane Stan

Stan developed from a tropical wave that moved westward from the coast of Africa on 17 September. The wave generated a persistent area of disturbed weather over the western Caribbean Sea in late September. A tropical depression eventually formed from the system on 1 October about 115 nmi southeast of Cozumel (*Figure 1*). The cyclone moved west-northwestward, attaining tropical storm status just before crossing the east coast of the Yucatan Peninsula a little south of Tulum, Mexico on 2 October. Stan traversed the Yucatan and weakened to a depression, but regained tropical storm strength after moving into the Bay of Campeche on 3 October. The storm then turned westward and southwestward as it continued to strengthen, becoming a hurricane early on 4 October. A few hours later, Stan made landfall about 80 nmi east-southeast of Veracruz with maximum winds estimated at 70 kts. The cyclone weakened rapidly

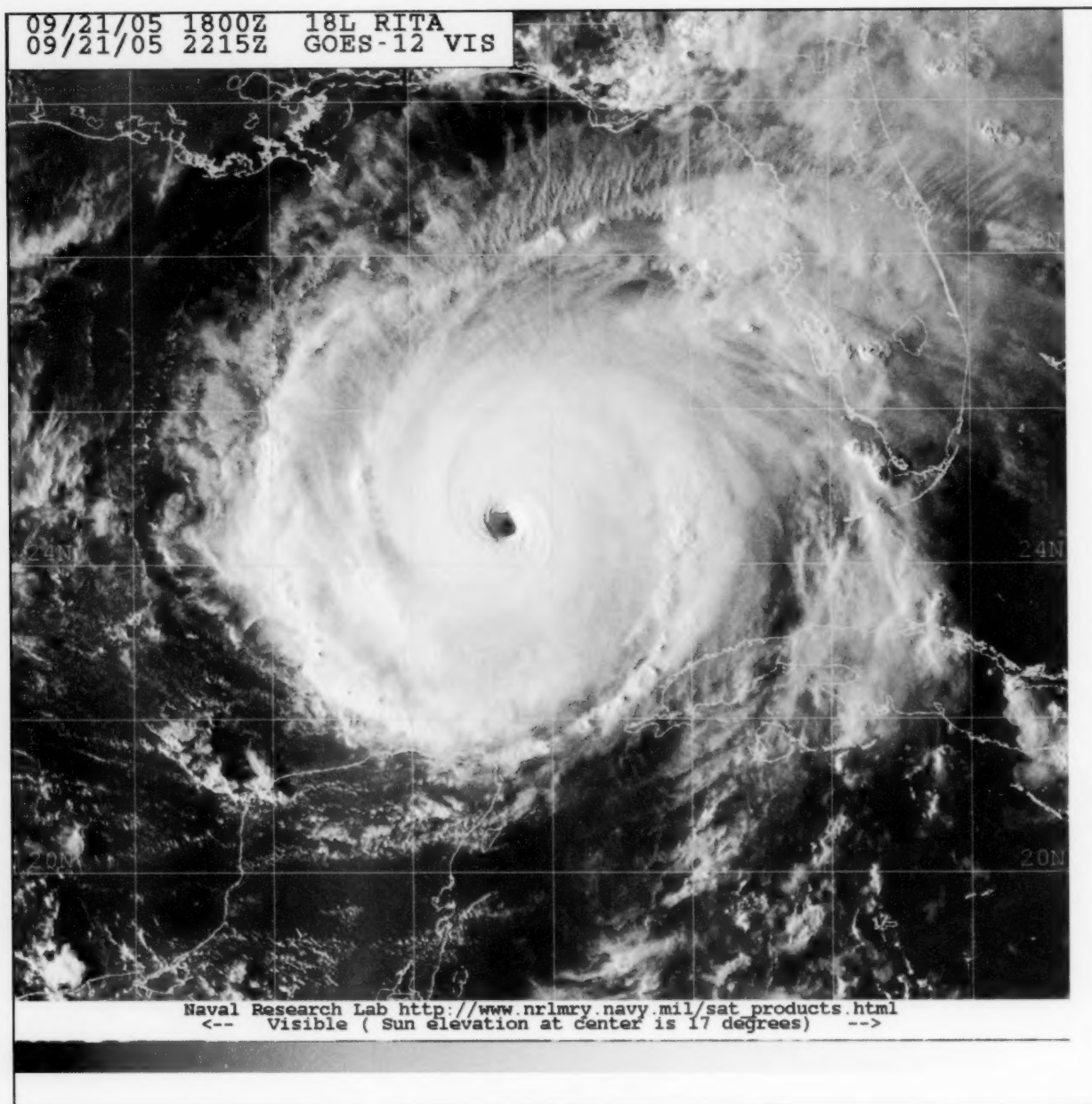


Figure 7. GOES-12 visible image of Hurricane Rita at 2215 UTC 21 September 2005.

Image courtesy of the Naval Research Laboratory, Monterey, CA

after moving inland and dissipated over the mountains of southern Mexico the next day.

Three ships reported sustained tropical-storm winds during Stan. The **Veendam** (C6NL6) reported 40 kts
 54 Mariners Weather Log

winds at 0600 UTC 5 October, while the **Edyth L** (ZCAM4) reported 37 kts winds at 1200 UTC 2 October. Additionally, the **Albert** (DGTX) reported 35 kts winds at 0000 UTC 5 October.

Stan, along with a larger area of disorganized disturbed weather, caused torrential rains with severe flash floods and mud slides over portions of Mexico, Guatemala, El Salvador, Nicaragua, Honduras, and Costa Rica.



The estimated death toll associated with this combined system ranges from 1000 to 2000. As best as can be determined, Stan itself was responsible for 80 of these deaths.

Unnamed Subtropical Storm

Post-storm analysis shows that a low pressure area in the eastern Atlantic had enough tropical characteristics to be considered a subtropical storm. An upper-level low formed west of the Canary Islands on September 28, with an associated surface trough developing on September 30. This system moved west-northwestward, with a surface low forming late on 3 October

about 400 nmi southwest of São Miguel Island in the Azores Islands. The low turned northeastward and became a subtropical depression early on 4 October and a subtropical storm shortly thereafter. Maximum sustained winds reached 45 kts as the center passed through the eastern Azores late that day. The storm turned north-northeastward early on 5 October as it merged with a cold front, and it was absorbed by a large non-tropical low (that would eventually become Hurricane Vince) later that day.

This system brought gale-force winds to the eastern portions of the Azores Islands. Santa Maria Island reported a

10-min average wind of 43 kts at 2100 UTC 4 October with a peak gust of 51 kts. Ponta Delgada on São Miguel reported 10-min average winds of 33 kts at 2230 UTC 4 October with a gust to 46 kts. There were no reports of casualties or damages.

Tropical Storm Tammy

Tammy was a short-lived tropical cyclone that developed from an interaction between a tropical wave that left Africa on 24 September and an upper-level trough. Early on 5 October, this combination produced a tropical storm about 20 nmi east of

Date/Time (UTC)	Ship name/call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
18 / 1500	El Morro	22.1	70.5	120 / 35	1009.5
19 / 0600	3FPS9	24.7	73.9	080 / 35	1011.0
19 / 0700	El Yunque	24.0	72.9	090 / 40	1009.6
19 / 0900	3FPS9	24.2	73.2	060 / 54	1009.0
19 / 1800	CSX Producer	22.5	67.7	120 / 44	1013.0
19 / 2100	A8FS4	24.7	74.7	110 / 37	1008.5
21 / 0900	Jo Selje	26.0	83.4	070 / 41	1005.5
21 / 1500	Discover Spirit	27.5	90.4	020 / 40	1010.0
21 / 1700	C6FM5	23.5	83.8	160 / 38	1006.5
21 / 1800	Philadelphia	22.8	84.5	180 / 36	1003.1
21 / 1800	OOCL Fortune	23.0	84.3	180 / 38	1004.5
22 / 0900	M. V. Lykes Ranger	27.7	85.7	080 / 37	1005.0
22 / 0900	Deepwater Millenium	28.0	87.0	100 / 40	1008.0
22 / 0900	V7HD3	28.3	87.9	110 / 44	1002.0
22 / 1200	M. V. Lykes Ranger	27.1	85.2	080 / 37	1007.0
22 / 1200	Deepwater Horizon	28.3	87.7	030 / 47	1007.5
22 / 1500	Bernardo Quintana A	23.2	86.5	180 / 35	1003.7
22 / 1500	P&O Nedlloyd Jakarta	27.7	90.8	050 / 41	1005.0
22 / 1500	OOCL Inspiration	28.0	85.3	120 / 35	1010.0
22 / 1700	Deepwater Millenium	27.9	87.0	100 / 52	1009.5
22 / 1800	Liberty Star	27.3	85.4	100 / 45	1008.0
22 / 1800	Discoverer Deep Seas	28.0	89.7	060 / 39	1002.8
23 / 0600	Liberty Star	25.6	84.2	130 / 45	1009.0
23 / 1800	Discoverer Deep Seas	28.0	89.7	060 / 39	1002.8
24 / 1800	Bernardo Quintana A	29.0	87.5	140 / 37	1012.2

Table 7. Selected ship reports with winds of at least 34 kts for Hurricane Rita, 18–26 September 2005.



Jupiter, Florida (*Figure 1*). The cyclone moved steadily north-northwestward parallel to the Florida east coast most of the day. Late that day, it turned northwestward and made landfall along the northeastern Florida coast near Atlantic Beach with maximum sustained winds of 45 kts. Tammy moved westward over southern Georgia and southeastern Alabama on 6 October before becoming absorbed by a larger extratropical low pressure system over the Florida Panhandle the next day.

Several ships encountered Tammy's winds (*Table 8*). The strongest reported winds were from the **Cordelia** (A8GQ8)—45 kts at 0200 UTC 6 October. Additionally, an automated station operated by the Skidaway Institute of Oceanography off the Georgia coast reported sustained winds of 45 kts with a gust to 52 kts (elevation 164 ft) at 0234 UTC that day.

Tammy brought tropical storm conditions to portions of the southeastern coast of the United States. The NOS station at Fort Pulaski, Georgia reported 6-minute average winds of 38 kts at 0200 UTC 6 October with a peak gust of 45 kts. The C-MAN station at Folly Beach, South Carolina reported 10-minute average winds of 35 kts at 2030 UTC 5 October with a peak gust of 48 kts. There were no reports of casualties and damage was minor.

Hurricane Vince

Vince, the first known tropical cyclone to make landfall in Spain, had a non-tropical origin. The deep-layer frontal low that absorbed the unnamed subtropical storm moved southeastward across the Azores Islands on October 6. Over the next couple of days, the frontal structure gradually dissipated and banded convection became concentrated near the circulation center. It is estimated that the low became a subtropical storm early on 8 October when centered about 500 nmi southeast of Lajes in the Azores. The cyclone gradually acquired additional tropical characteristics and became a tropical storm and then a hurricane on 9 October while it moved slowly northeastward to the northwest of the Madeira Islands. Increasing vertical wind shear caused Vince to weaken to a tropical storm the next day as it accelerated east-northeastward. On 11 October, Vince weakened to a tropical depression shortly before making landfall near Huelva, Spain. The cyclone dissipated later that day over Spain.

Two ships reported tropical-storm force winds associated with Vince. The **Canmar Fortune** (ZCBD3) reported 35 kts winds at 1800 UTC 10 October, while the **Monteverde** (V2ON3) reported 41 kts winds three hours later. There were no reports of damage or casualties due to Vince.

Hurricane Wilma

Massive and powerful Wilma formed from a broad area of disturbed weather that stretched across much of the Caribbean Sea during the second week of October. A surface low pressure system gradually became defined near Jamaica on 14 October, leading to the formation of a tropical depression on 15 October about 190 nmi east-southeast of Grand Cayman (*Figure 1*). The cyclone moved erratically westward and southward for two days while strengthening into a tropical storm. Wilma became a hurricane and began a west-northwestward motion on 18 October. Later that day, Wilma began to explosively deepen. The central pressure dropped to 882 hPa near 0800 UTC 19 October, with the eye of the hurricane contracting to 2 to 4 nmi wide near that time. Wilma's maximum intensity is estimated to have been 160 kts a few hours after the 882 hPa pressure (*Figure 8*). On 20 October, Wilma weakened slightly and turned north-westward toward the northeastern Yucatan Peninsula. Late on 21 October, the slow-moving hurricane made landfall over Cozumel, followed by landfall early the next day over the northeastern Yucatan Peninsula—both at Category 4 intensity.

Wilma moved slowly and weakened over northeastern Yucatan, emerging over the Gulf of Mexico early on 23

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
05 / 2300	Asphalt Commander	31.1	79.0	130 / 39	1013.0
06 / 0200	Cordelia	32.4	78.3	110 / 45	1016.0
06 / 0300	Unknown Ship (WDC692)	31.4	80.7	120 / 44	1003.5
06 / 0600	Jo Ask	31.7	80.3	110 / 35	1008.8

Table 8. Selected ship and buoy reports with winds of at least 34 kts for Tropical Storm Tammy, 5–6 October 2005.



October as a Category 2 hurricane. Later that day it accelerated northeastward toward southern Florida. The hurricane regained Category 3 intensity over the Gulf waters before its center made landfall near Cape Romano around 1030 UTC 24 October. The eye crossed the Florida Peninsula in less than five hours, with Wilma moving into the Atlantic just north of Palm Beach as a Category 2 hurricane. Wilma briefly re-intensified just east of Florida, then weakened thereafter. The hurricane moved rapidly northeastward over the western Atlantic and became extratropical about 200 nmi southeast of Halifax, Nova Scotia late on 25 October. The remnants of Wilma were absorbed by another low late the next day.

Many ships encountered Wilma (**Table 9**), although none encountered the powerful inner core region. The highest reported winds were from the **Undine** (SHJC), which reported 58 kts winds at 1200 UTC 25 October. It should be noted that Wilma co-existed with a extratropical low near the northeastern coast of the United States on 25 October. Thus, some of the reports in **Table 9** are likely due to winds from a combination of the two systems.

Wilma brought hurricane conditions to the northeastern Yucatan Peninsula and the adjacent islands, as well as to southern Florida. In Mexico, Cancun reported 10-minute average winds of 87 kts with a gust to 113 kts at 0000 UTC 22

October, while Cozumel reported a pressure of 928.0 hPa late on 21 October. In Florida, a South Florida Water Management District (SFWMD) station in Lake Okeechobee reported 15-minute average winds of 80 kts with a gust to 97 kts at 1500 UTC 24 October, while a nearby SFWMD station in Belle Glade reported a gust to 102 kts.

Twenty-two deaths have been directly attributed to Wilma: 12 in Haiti, 1 in Jamaica, 4 in Mexico, and 5 in Florida. The hurricane caused severe damage in northeastern Yucatan, including Cancun and Cozumel, and widespread damage estimated at \$16.8 billion in southern Florida. Wilma also produced major floods over in Cuba.

The 882 hPa pressure estimated in Wilma is the lowest central pressure on record in an Atlantic hurricane,

breaking the old record of 888 hPa set by Hurricane Gilbert in September 1988. The central pressure fell 88 hPa in 12 hours, shattering the record of 48 hPa in 12 hours held by Hurricane Allen in August 1980.

Tropical Storm Alpha

For the first time, the National Hurricane Center exhausted the annual standard list of names and had to use the Greek alphabet to name a tropical cyclone when Alpha formed. A vigorous tropical wave passed through the Windward Islands on 19 October. Shower activity became concentrated south of Puerto Rico, and a tropical depression formed early on 22 October about 180 nmi south-southwest of San Juan (**Figure 1**). The depression became Tropical Storm Alpha later that day. Alpha moved northwestward and made land-

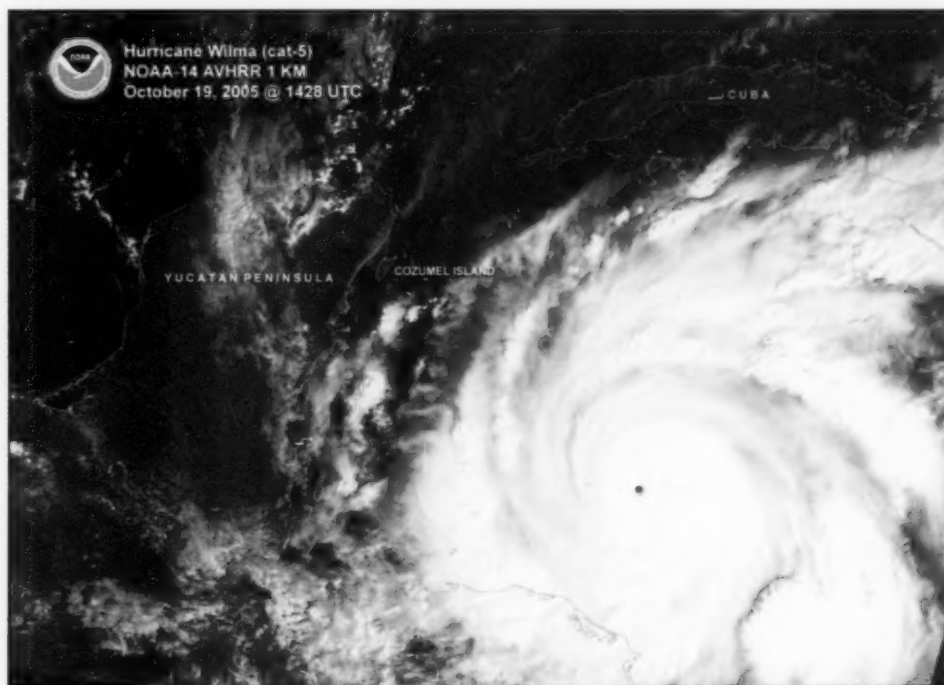


Figure 8. NOAA-14 multispectral image of Hurricane Wilma at 1428 UTC 19 October 2005.

Image courtesy of the National Climatic Data Center, Asheville, NC



Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
20 / 1200	Unknown Ship (WCY845)	18.8	80.2	130 / 36	1007.0
20 / 2100	Merkur Sky	18.9	82.3	140 / 35	1004.0
23 / 2100	Pacific Viking (A8FN3)	20.3	84.2	240 / 43	1001.6
23 / 2100	UBC Saiki (P3GY9)	21.8	85.3	260 / 46	993.0
24 / 0000	Edyth L	23.4	88.1	340 / 37	1002.2
24 / 0000	Deepwater Millenium	28.3	88.0	010 / 37	1009.0
24 / 0600	Unknown Shi; (WCY845)	20.0	82.6	230 / 35	1004.0
24 / 0600	Seakeepers (KS049)	26.4	85.2	010 / 39	993.8
24 / 0900	Seakeepers (KS049)	25.7	86.0	350 / 41	997.6
24 / 1200	Fortune Pioneer I	25.6	77.1	160 / 44	1002.0
24 / 1500	Sealand Motivator (WAAH)	26.2	76.2	170 / 39	999.5
24 / 1800	P&O Nedlloyd Marseille	24.1	74.8	190 / 49	1005.6
24 / 2100	Sealand Motivator (WAAH)	25.7	75.8	230 / 44	997.8
24 / 2200	Sumida	36.4	74.6	020 / 47	996.4
25 / 0000	Coral Princess	23.2	79.0	270 / 38	1007.9
25 / 0000	Spaarnegracht	28.6	67.2	210 / 35	1008.8
25 / 0000	Nedlloyd Holland	35.5	75.2	020 / 41	992.0
25 / 0300	Nedlloyd Holland	36.2	75.3	050 / 40	990.8
25 / 0500	Sumida	37.4	74.4	020 / 48	989.2
25 / 0600	ZIM Savannah (A8ER9)	34.9	75.2	350 / 37	989.0
25 / 0600	Gypsum Centennial (ZCDC2)	37.0	75.1	030 / 38	991.0
25 / 0600	Barcelona Bridge (A8CJ2)	37.4	74.2	050 / 37	987.0
25 / 0600	Atlantis	40.2	66.3	090 / 36	997.5
25 / 0900	OOCL Inspiration	35.5	75.2	300 / 37	990.1
25 / 0900	Albatross IV	41.5	70.7	070 / 35	1001.0
25 / 1100	Sumida	38.0	74.2	010 / 37	986.6
25 / 1200	Canmar Trader (V2AW5)	27.3	69.0	190 / 37	1015.0
25 / 1200	Undine	40.1	70.1	070 / 58	990.4
25 / 1200	OOCL Faith	43.8	62.9	070 / 40	1013.0
25 / 1500	Atlantic Superior	43.5	70.0	040 / 43	1002.0

Table 9. Selected ship reports with winds of at least 34 kts for Hurricane Wilma, 15–25 October 2005.



fall near Barahona, Dominican Republic on 23 October with 45 kts winds. Alpha weakened to a tropical depression over the high terrain of Hispaniola, with the cyclone continuing northwestward and northward over the southeastern Bahamas and the Atlantic later that day. The system was absorbed by the much larger Hurricane Wilma late on 24 October.

Barahona reported sustained winds of 45 kts as the center of Alpha passed nearby. Alpha caused 17 deaths in Haiti and 9 in the Dominican Republic, primarily from flooding caused by heavy rains.

Hurricane Beta

Beta originated from the same tropical wave that spawned Tropical Storm Alpha. The system began to become organized over the southwestern Caribbean Sea on 25 October, and a tropical depression formed the next day about 90 nmi north of the north-central coast of Panama. Moving slowly northward, the depression became a tropical storm on October 27. Beta reached hurricane strength on 29 October near the Colombian island of Providencia. It then turned westward and west-southwestward on 30 October while strengthening to an estimated peak intensity of 100 kts (Category 3) (*Figure 9*). Slight weakening occurred before Beta made landfall as a Category 2 hurricane near La Barra del Rio Grande on the east coast of Nicaragua. Beta moved westward and dissipated over west-central Nicaragua early on 31 October.

Two ships reported tropical storm-force winds from Beta. The **Edyth L.** (ZCAM4) reported 50 kts winds at 0900 UTC 28 October, while the **Dioli** (PJRP) reported 39 kts winds at 0600 UTC 30 October.

There were no reports of casualties from Beta. The storm caused widespread damage on Providencia Island and extensive damage to structures along the central Nicaraguan coast. Heavy rains associated with the fringe of Beta, along with significant floods, occurred in Honduras.

Tropical Storm Gamma

The vigorous tropical wave that spawned Gamma moved off the coast of Africa on 3 November. The wave passed through the southern Windward Islands on 13 November, producing wind gusts to near tropical storm-force along with heavy rainfall. Early on 14 November, the wave initiated a tropical depression over the Caribbean Sea about 85 nmi west of St. Vincent (*Figure 1*). The cyclone moved westward and was briefly a tropical storm the next day. Thereafter, strong westerly upper-level shear caused Gamma to degenerate back into a tropical wave. The wave accelerated westward across the central Caribbean Sea on 17 November before slowing down over the western Caribbean and eastern Honduras on 18 November. In the meantime, a large non-convective low pressure system developed over Panama, moved northwestward, and merged with the wave over central Honduras. This combination regenerated into a tropical storm near the northern coast of Honduras late on 18 November. Gamma drifted northward over the northwestern Caribbean Sea and strengthened to its peak intensity of 45 kts while just east of Roatan Island on 19 November. It then turned slowly southeastward during 20–21 November while weakening due to northwesterly vertical wind shear. Gamma weakened into a non-convective remnant low late on 21 November and dissipated the next day

just east of the Nicaragua-Honduras border.

There were no ship observations from Gamma while it was a tropical cyclone, although an unidentified ship and NOAA buoy 42057 both reported 35 kts winds associated with the tropical wave. A private weather station on Roatan reported sustained winds of 43 kts at 0730 UTC 19 November. Heavy rain caused flash floods and mud slides in Honduras and Belize, resulting in 37 deaths—34 in Honduras and 3 in Belize. The rains and floods also caused damage to crops and bridges.

Tropical Storm Delta

Delta originated from an extratropical low over the central Atlantic, which formed on 19 November about 1200 nmi southwest of the Azores. The low moved eastward and then northeastward, reaching a location about 710 nmi southwest of the Azores on 22 November. Turning south-southwestward, it developed into a subtropical storm later that day (*Figure 1*). Delta continued south-southwestward on 23 November as it became a tropical storm, and winds reached an estimated 60 kts the next day as the storm stalled about 1150 nmi west-southwest of the Canary Islands. Delta moved southwestward on 25 November, then turned east-northeastward on 26 November. Weakening occurred during this time, with estimated maximum winds decreasing to 35 kts on 26 November. Delta accelerated northeastward and re-intensified on 27 November, with maximum winds again reaching 60 kts. Turning eastward, the cyclone became a vigorous extratropical low on 28 November centered about 215 nmi west-northwest of the western Canary Islands. The low passed north of the Canary Islands later on 28 November before weakening and moving into Morocco

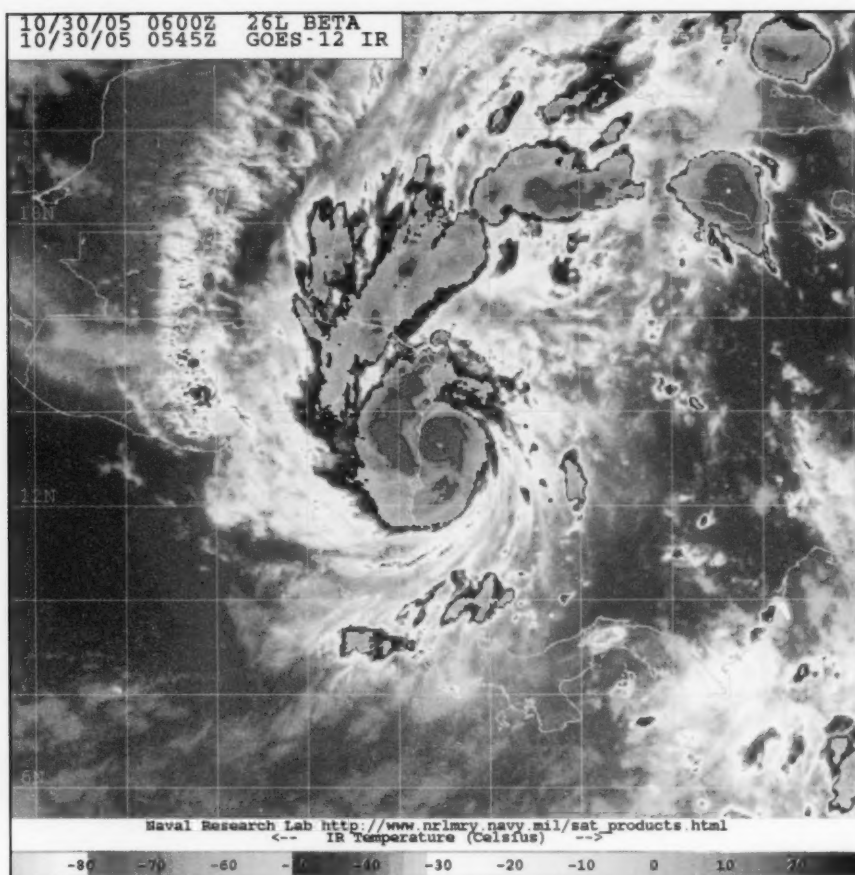


Figure 9. GOES-12 infrared image of Hurricane Beta near peak intensity at 0545 UTC 30 October 2005.

Image courtesy of the Naval Research Laboratory, Monterey, CA

on 29 November. It dissipated late that day over northwestern Algeria.

Several ships encountered Delta (*Table 10*), particularly during its early life when it had a large cyclonic envelope. The **British Merchant** (VQIB9) reported 60 kts winds and a 990.8 hPa pressure at 1800 UTC 27 November. The extratropical remnants of Delta brought storm-force winds and gusts to hurricane force to the Canary Islands on 28 November.

There were no reports of casualties or damages from Delta while it was a tropical or subtropical cyclone.

However, the subsequent extratropical low caused seven deaths in or near the Canary Islands.

Hurricane Epsilon

Epsilon, like its predecessor Delta, had a non-tropical origin. A gale center formed about 1000 nmi east of Bermuda on 27 November. The low developed central convection and transformed into a tropical storm on 29 November (*Figure 1*). Over the next few days, Epsilon tracked in a small cyclonic loop while it gradually intensified. The cyclone moved north-eastward and became a hurricane on 2

December about 850 nmi east-north-east of Bermuda. An eastward motion began on 3 December and continued through 5 December. The hurricane reached an estimated peak intensity of 75 kts early on 5 December. Weakening began as Epsilon turned southwestward on 6 December. It became a tropical storm on 7 December, followed by decay to a tropical depression and a non-convective remnant low the next day. The low dissipated on 9 December about 990 nmi southwest of the Azores. There were no reports of casualties or damages due to Epsilon.



Date/Time (UTC)	Ship name/call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
22 / 1200	Chiquita Schwiez	30.3	41.4	340 / 44	990.8
22 / 1800	Chiquita Belgie	30.7	44.3	360 / 45	999.2
23 / 0000	Chiquita Belgie	31.2	43.2	360 / 45	996.8
23 / 0000	Chiquita Schwiez	32.8	38.5	130 / 37	999.2
23 / 0300	Sealand Quality	29.9	43.5	360 / 44	993.8
23 / 0600	Sealand Quality	30.0	42.8	010 / 44	992.2
23 / 0600	Chiquita Belgie	31.9	42.0	050 / 45	1000.7
23 / 1200	Sealand Quality	30.4	41.5	050 / 44	998.2
23 / 1200	DINA11	31.5	35.5	070 / 47	1005.0
24 / 1200	DINA11	28.3	42.3	030 / 47	1008.0
27 / 1800	British Merchant	29.1	30.0	030 / 60	990.8
28 / 1800	Poseidon	28.3	15.3	180 / 35	1000.7

Table 10. Selected ship reports with winds of at least 34 kts for Tropical Storm Delta, 22–28 November 2005.

Tropical Storm Zeta

Zeta, the second-latest tropical storm to form in the Atlantic basin, developed from an old frontal zone and an upper-level trough. This combination spawned a surface low pressure area on 29 December about 675 nmi northwest of the Cape Verde Islands. The low became first a tropical depression and then a tropical storm on 30 December. Zeta moved slowly from 30 December to 1 January—first northwestward, then westward, then southwestward. It reached an estimated peak intensity of 55 kts on 1 January 2006, then weakened due to vertical shear. A faster, generally west-southwestward, motion began on 2 January and continued the next day. Re-intensification occurred on 3 January, and Zeta again reached an estimated peak intensity of 55 kts. The storm turned westward on 4 January and west-northwestward the next day. Increasing shear again caused weakening, and Zeta became a depression on 6 January. The depression became a non-convective low late that day, and it dissipated about

575 nmi southeast of Bermuda on 7 January 2006.

The *Liberty Star* (WCBP) reported 34 kts winds about 40 nmi north of the circulation center at 0800 UTC 31 December. There were no reports of damage or casualties due to Zeta.

Tropical and Subtropical Depressions

Two tropical depressions and one subtropical depression occurred during the 2005 season (*Figure 2*). The short-lived Tropical Depression Ten formed on 13 August about 925 nmi east of Barbados and dissipated the next day. Tropical Depression Nineteen formed on 30 September about 500 nmi west-southwest of the Cape Verde Islands. It moved generally northwestward and dissipated on 2 October about 585 nmi west of the Cape Verde Islands.

Subtropical Depression Twenty-Two formed on 8 October about 535 nmi southeast of Bermuda, and subsequently moved northwestward and

westward. It weakened to a low pressure on 10 October about 150 nmi west-southwest of Bermuda. The low turned northward and became extratropical the next day. On 12–14 October it produced gale-force winds over portions of the northwestern Atlantic.

Acknowledgments:

The cyclone summaries are based on reports prepared by the author and the other Hurricane Specialists at the National Hurricane Center (NHC): Lixion Avila, James Franklin, Rick Knabb, Richard Pasch, and Stacy Stewart. Additional material was contributed by Tropical Prediction Center/NHC colleagues Eric Blake, Dan Brown, Hugh Cobb, Colin McAdie, Jamie Rhome, and David Roberts. Ethan Gibney prepared the main track map.



Eastern North Pacific Hurricane Season of 2005

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Introduction

Fifteen named tropical storms occurred in the eastern North Pacific basin during 2005. Seven of the tropical storms became hurricanes, but only one (Kenneth) became a major hurricane (category three or stronger on the Saffir-Simpson hurricane scale) in the eastern North Pacific basin. One of the hurricanes (Jova) also reached major hurricane status after crossing into the central Pacific basin. As in 2004, the activity was below

average in terms of the numbers of hurricanes and major hurricanes. The long-term seasonal averages are 15 tropical storms, nine hurricanes, and four major hurricanes. There was one additional tropical depression in 2005 that did not reach tropical storm intensity. Six of the named storms formed between 12-28 September. No system made landfall as a tropical storm or hurricane. However, Adrian made landfall in Honduras as a tropical depression.

Individual Storms

The vital statistics of the named storms of 2005 are given in *Table 1*, while the tracks are shown in *Figure 1*. The track of the one non-developing depression is shown in *Figure 2*. In the cyclone summaries given below, all dates are based on Universal Coordinated Time, although local time is implied with expressions such as "afternoon," "mid-day," etc.

Storm	Class*	Dates**	Maximum Winds (kts)	Minimum Pressure (hPa)	Deaths
Adrian	H	17-21 May	70	982	1
Beatriz	TS	21-24 June	45	1000	0
Calvin	TS	26-29 June	45	1000	0
Dora	TS	4-6 July	40	1003	0
Eugene	TS	18-20 July	60	989	0
Fernanda	H	9-16 August	75	978	0
Greg	TS	11-15 August	45	1000	0
Hilary	H	19-25 August	90	970	0
Irwin	TS	25-28 August	45	1000	0
Jova	H	13-24 September	85***	973***	0
Kenneth	H	14-30 September	115	948	0
Lidia	TS	17-19 September	35	1005	0
Max	H	18-22 September	75	981	0
Norma	TS	23-27 September	50	997	0
Otis	H	28 September – 3 October	90	970	0

* TS - tropical storm, maximum sustained winds 34-63 kt; H - hurricane, maximum sustained winds 64 kt or higher.

** Dates based on UTC time and include tropical depression stage.

*** Jova later had maximum winds of 110 kt and a minimum pressure of 951 mb in the central Pacific basin

Table 1. 2005 Eastern North Pacific Tropical Storms and Hurricanes.

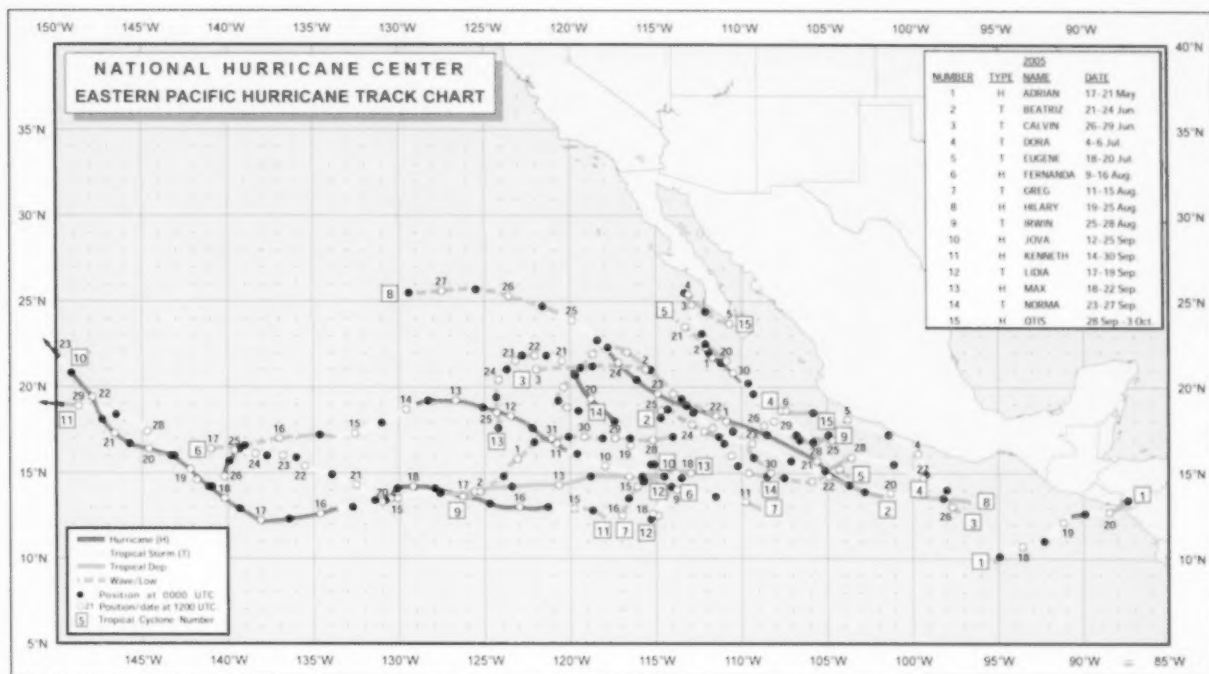


Figure 1. Tracks of eastern North Pacific tropical storms and hurricanes of 2005.

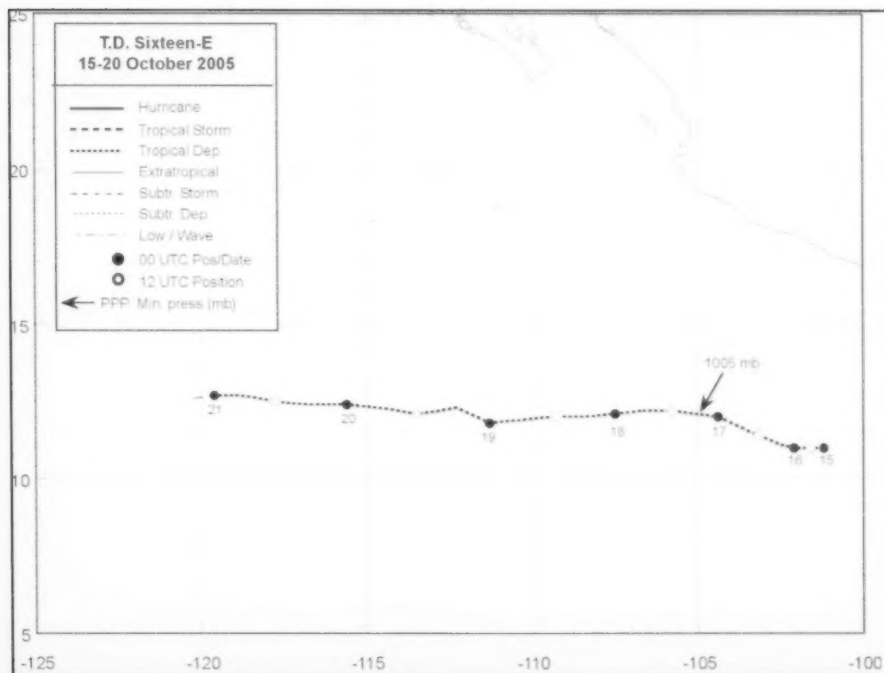


Figure 2. Best track positions for Tropical Depression Sixteen-E, 15-20 October 2005.



Hurricane Adrian

Adrian originated from the combination of a broad area of low pressure south of Acapulco, Mexico and a tropical wave that crossed Central America and entered the eastern North Pacific on 15 May. A tropical depression formed from these systems on 17 May while centered about 400 nmi west-southwest of El Salvador (*Figure 1*), and it strengthened into a tropical storm early the next day. The storm moved generally toward the east-northeast. Data from a U. S. Air Force Reserve reconnaissance aircraft indicate that Adrian reached hurricane strength with a peak intensity of 70 kts on 19 May about 75 nmi southwest of El Salvador. A post-storm analysis indicates that Adrian did not make landfall as a hurricane in El Salvador early on 20 May, as assessed operationally. Instead, southwesterly wind shear caused Adrian to weaken just offshore (*Figure 3*). Adrian was a weakening tropical storm early on 20 May as it moved eastward just off the coast of El Salvador, and later that day it entered the Gulf of Fonseca,

east of El Salvador, as a tropical depression. The depression then made landfall on the Pacific coast of Honduras during the evening of 20 May, and by the end of that day the circulation had dissipated inland.

Two ships reported tropical storm-force winds from Adrian. The yacht **SV-Carina** reported 43 kts winds near 0400 UTC 20 May, while the **Iver Expert** (PCEX) reported 35 kts winds at 1200 UTC 20 May.

Even though the center did not make landfall in El Salvador, media reports indicate that heavy rainfall caused floods and mud slides there. Flooding from Adrian in Nicaragua caused one fatality, the only known death of the eastern Pacific season. Adrian was only the third eastern Pacific tropical cyclone since 1949 to make landfall in Central America (all were depressions), and no eastern Pacific hurricane has come closer to El Salvador than Adrian in at least 57 years.

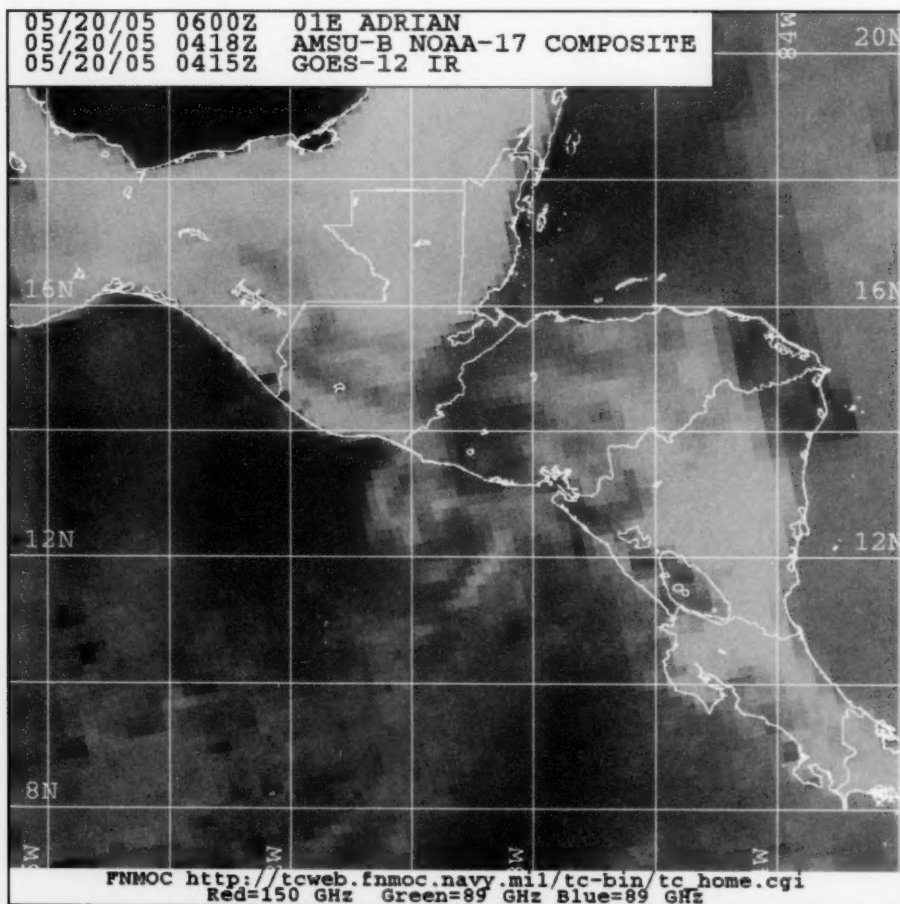


Figure 3. NOAA-17 89 GHz microwave image of Hurricane Adrian at 0418 UTC 20 May. The low-level circulation center is exposed to the southwest of the convection occurring over El Salvador.

Image courtesy of the Fleet Numerical meteorology and Oceanography Center, Monterey, CA.



Tropical Storm Beatriz

Beatriz developed from a tropical wave that crossed the west coast of Africa on 8 June and entered the eastern North Pacific basin on 17 June. The system became a depression on 21 June about 240 nmi south of Zihuatanejo, Mexico (*Figure 1*). The cyclone strengthened slowly as it moved west-northwestward, well offshore the Mexican coast, becoming a tropical storm on 22 June and reaching its estimated peak intensity of 45 kts early on 23 June. Easterly wind shear halted development, and Beatriz weakened to a depression over cooler waters early on 24 June. The cyclone degenerated into a non-convective remnant low later that day about 250 nmi south-southwest of Cabo San Lucas, Mexico on the southern tip of Baja California. The low dissipated two days later.

Tropical Storm Calvin

Calvin developed from a tropical wave that emerged from the west coast of Africa on 11 June and crossed Central America around 21 June. The area of disturbed weather associated with the wave moved slowly westward to the south of eastern Mexico for a few days, with unsteady development. A tropical depression formed on 26 June about 285 nmi south-southeast of Acapulco (*Figure 1*). The cyclone became a tropical storm later that day and reached its estimated peak intensity of 45 kts on 27 June. As with Beatriz, the cyclone's development trend was reversed by easterly wind shear. Calvin weakened to a depression on 28 June and degenerated into a remnant low the next day. The remnant circulation continued toward the west-northwest while producing intermittent but disorganized deep convection through 2 July. The low then turned westward and dissi-

pated on 3 July about 680 nmi west-southwest of Cabo San Lucas.

There were two ship reports of tropical storm-force winds from Calvin. The **Saga Wind** (VRUR7) reported 34 kts winds at 1800 UTC 26 June, while the **ITB New York** (WDVG) reported 34 kts winds at 0900 UTC 27 June.

Tropical Storm Dora

Dora originated from a tropical wave that moved off the west coast of Africa on 18 June and crossed Central America on 1 July. It became a tropical depression on 4 July about 145 miles south of Acapulco, and it became a tropical storm later that day about 90 nmi southeast of Zihuatanejo (*Figure 1*). Dora moved northwestward and its center came within 35 nmi of the Mexican coast near Zihuatanejo before turning west-northwestward and moving parallel to the coastline on 5 July. It weakened to a tropical depression later that day over cooler waters. Dora turned westward away from Mexico on 6 July and degenerated to a remnant low. The low dissipated late that day about 220 nmi west of Manzanillo, Mexico.

The **Nikkei Phoenix** (H9UY) reported 40 kts winds at 1500 UTC 4 July. This was the basis for the assessed peak intensity of Dora.

Tropical Storm Eugene

Eugene formed from a tropical wave that reached the eastern Caribbean Sea on 10 July and entered the eastern North Pacific by 14 July. The system developed into a tropical depression early on 18 July about 265 nmi south of Manzanillo, and it became a tropical storm later that day (*Figure 1*). The storm moved generally north-westward and parallel to the coast of

Mexico for about a day, and it reached its estimated peak intensity of 60 kts late on 19 July while located about 205 miles west-southwest of Cabo Corrientes. Eugene soon weakened to a tropical depression over cooler waters and was reduced to a remnant low early on 21 July. The remnant low continued northwestward and dissipated about 24 hours later.

While there were no ship reports of tropical storm-force winds from Eugene, a report of 30 kts from the **Providence Bay** (MSTM6) at 1200 UTC 18 July was instrumental in designating the cyclone as a tropical storm.

Hurricane Fernanda

Fernanda developed from a tropical wave that crossed the west coast of Africa on 25 July. It became a depression about 575 nmi south-southwest of Cabo San Lucas on 9 August and became a tropical storm on 10 August as it moved toward the west-northwest (*Figure 1*). Fernanda reached hurricane status on 11 August and attained its estimated peak intensity of 75 kts on 12 August before moving toward cooler waters and a hostile atmospheric environment. Thereafter, Fernanda moved toward the west-southwest and gradually weakened, dissipating on 17 August.

Tropical Storm Greg

Greg originated from a tropical wave that emerged from the west coast of Africa on 27 July and crossed Central America on 6 August. The system developed into a tropical depression about 600 nmi south of Cabo San Lucas on 11 August, and it became a tropical storm later that day (*Figure 1*). Greg moved slowly to the west-northwest and reached its estimated peak intensity of 45 kts on 12 August.



Ridging between Greg and Fernanda forced Greg to drift to the south and southwest while northerly shear weakened the cyclone. Greg weakened to a depression late on 14 August and then degenerated into a remnant low on 16 August about 650 nmi south-southwest of Cabo San Lucas.

Hurricane Hilary

The genesis of Hilary was associated with a tropical wave that moved off the west coast of Africa on 4 August and entered the eastern North Pacific on 17 August. The system developed into a tropical depression about 140 nmi south of Puerto Angel, Mexico on 19 August (*Figure 1*). It moved westward and became a tropical storm the next day. For the next couple of days it took a path roughly parallel to the Mexican coast about 225 nmi off-shore. It became a hurricane early on 21 August with a large area of tropical-storm force winds northeast of the center. Hilary edged away from the mainland and strengthened, reaching an estimated peak intensity of 90 kts on 22 August. A slow weakening trend ensued as Hilary moved generally northward over cooler waters. The cyclone weakened to a tropical storm on 24 August about 435 nmi west of Cabo San Lucas, and

it weakened to a depression and then a non-convective remnant low the following day. The low continued westward for the next few days and dissipated early on 28 August.

Several ships reported tropical storm-force winds from Hilary (*Table 2*). The most notable observation was from the **Chembulk Vancouver** (DGVC), which reported 45 kts winds at 2100 UTC 21 August. Hilary brought tropical storm conditions to the coast of Mexico near Manzanillo, which reported sustained winds of 35 kts with a gust to 40 kts at 2145 UTC 21 August. There were no reports of damages or casualties.

Tropical Storm Irwin

Irwin likely originated from the southern portion of the tropical wave that emerged from the west coast of Africa on 10 August and then spawned powerful Atlantic Hurricane Katrina. The wave entered the eastern North Pacific on 22 August and led to the development of a tropical depression on 25 August about 135 nmi south of Manzanillo (*Figure 1*). The depression moved westward and became a tropical storm early on 26 August. Irwin reached its estimated peak intensity of 45 kts later that day, but then it slowly weakened on 27

August. The cyclone weakened to a depression early on 28 August and to a remnant low later that day while centered about 490 nmi southwest of Cabo San Lucas, and the remnant low persisted through 2 September.

The only report of tropical storm-force winds in Irwin was from a ship with the call sign WCY845, which reported 37 kts winds at 0300 UTC 26 August. However, the ship was far from the center at the time and the reliability of the report is uncertain.

Hurricane Jova

Jova was a long-track hurricane that crossed into the central Pacific basin and briefly threatened the Hawaiian Islands. Jova originated from a tropical wave that crossed the west coast of Africa on 28 August and entered the eastern North Pacific on 4 September. A tropical depression formed from this system nearly a week later, on 12 September, about 550 nmi south-southwest of Cabo San Lucas (*Figure 1*). However, upper-level winds hindered development and Jova did not reach tropical storm status until early on 15 September about 1150 nmi west-southwest of Cabo San Lucas. Jova continued on a track slightly south of due west for the next two days and gradually

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
20 / 0000	Mighty Servant I	10.3	104.7	290 / 35	1008.2
21 / 2100	Chembulk Vancouver	18.6	103.9	130 / 45	1008.0
21 / 2100	Green Dale WCZ523	19.3	105.6	120 / 37	1006.1
22 / 0000	Green Dale (WCZ523)	19.2	105.2	160 / 40	1008.0
22 / 0000	MSC Diego (3FZP8)	20.0	106.5	140 / 37	1005.0
22 / 0600	Washington Highway	20.3	107.9	110 / 36	1009.2

Table 2. Selected ship reports with winds of at least 34 kts for Hurricane Hilary, 19–25 August 2005.



strengthened. It became a hurricane early on 16 September. Late on 17 September, Jova turned toward the northwest near 140°W longitude and slowly intensified, and it became a major hurricane in the central Pacific hurricane basin on 19 September (*Figure 4*). Jova maintained Category 3 status during the next two days. However, the northwestward motion took the hurricane over cooler waters, and steady weakening began early on 22 September when Jova was located about 410 nmi east of the Hawaiian Islands. Jova weakened to a tropical

storm early on 23 September as increasing southwesterly vertical shear accelerated the weakening process, and it became a tropical depression early on 24 September. Jova dissipated on 25 August about 260 nmi north of Hilo, Hawaii.

Hurricane Kenneth

The long-lived Kenneth can possibly be traced back to a tropical wave that crossed into the eastern North Pacific by 9 September. This system moved westward within the Intertropical Convergence Zone (ITCZ) for several

days. By 13 September, the disturbed weather associated with this system started showing signs of organization. On 14 September, the cloud pattern became sufficiently well organized to indicate the formation of a tropical depression about 780 nmi southwest of Cabo San Lucas, and the depression became a tropical storm the following day (*Figure 1*). Kenneth moved mainly westward and intensified into a hurricane on 16 September. The hurricane continued to strengthen and developed a well-defined eye, and it reached its estimated peak intensity

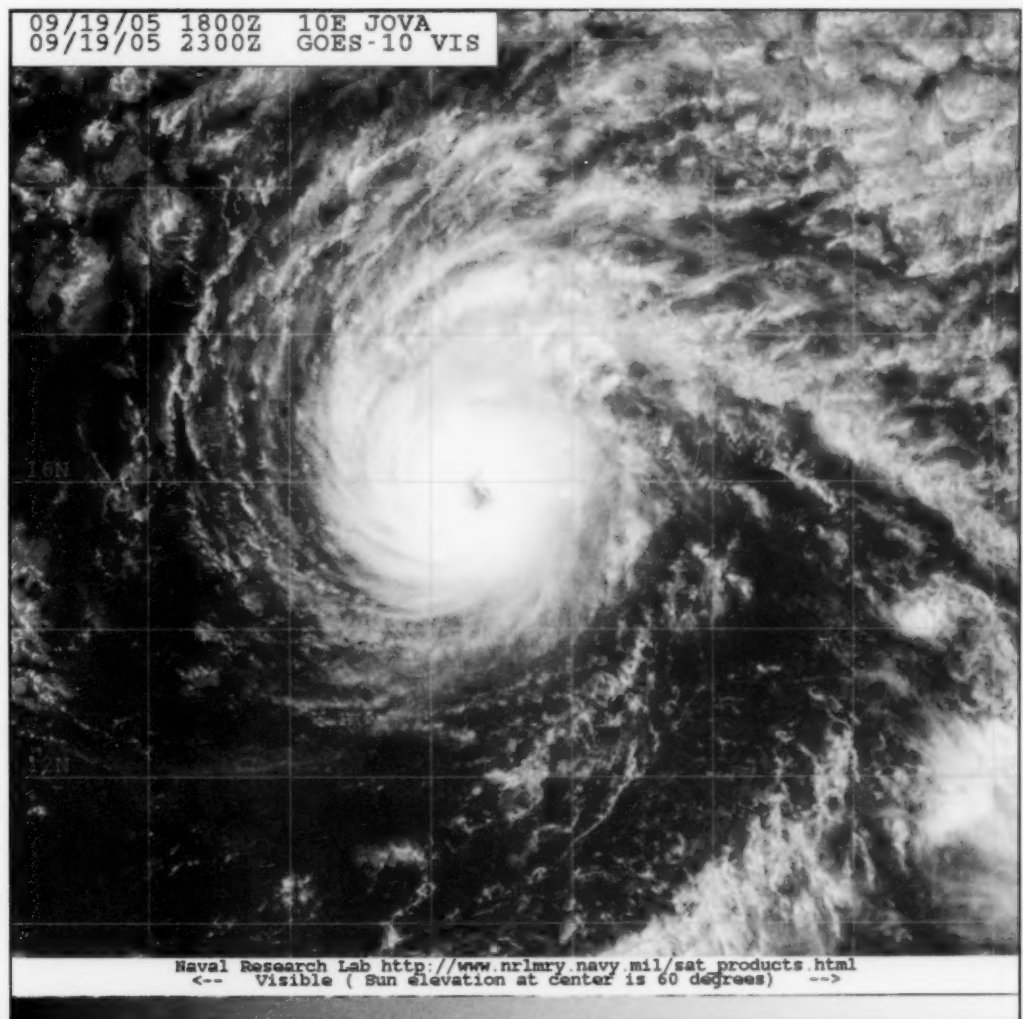


Figure 4. GOES-10 visible image of Hurricane Jova near peak intensity at 2300 UTC 29 September

Image courtesy of the Naval Research Laboratory, Monterey, CA.



of 115 kts on 18 September (*Figure 5*). Moving slowly, Kenneth gradually weakened to below hurricane strength on 20 September and to an estimated 45 kts on 21 September. The cyclone fluctuated in intensity over the next several days, but it eventually regained hurricane status on 25 September. Kenneth drifted south-westward across 140°W longitude and into the central Pacific basin on 26 September. Shortly thereafter, the cyclone weakened again to below hurricane strength. Kenneth turned north-westward and continued to weaken, and it became a tropical depression on

29 September about 350 nmi east of the island of Hawaii. It dissipated just east of the Big Island on 30 September. The remnants of Kenneth passed south of the Hawaiian Islands and produced some locally heavy rains there.

Tropical Storm Lidia

The short-lived Lidia developed from a tropical wave, although it is not certain which of the waves that entered the eastern North Pacific during 10–15 September was directly involved in the genesis of the cyclone.

The system became a depression on 17 September about 725 nmi southwest of Cabo San Lucas and became a tropical storm later that day (*Figure 1*). Lidia moved very little and on 18 September it weakened back to a depression. It was absorbed by the much larger circulation of Tropical Storm (and later Hurricane) Max early on 19 September.

Hurricane Max

Max originated from a tropical wave that emerged from the west coast of Africa on 4 September and crossed

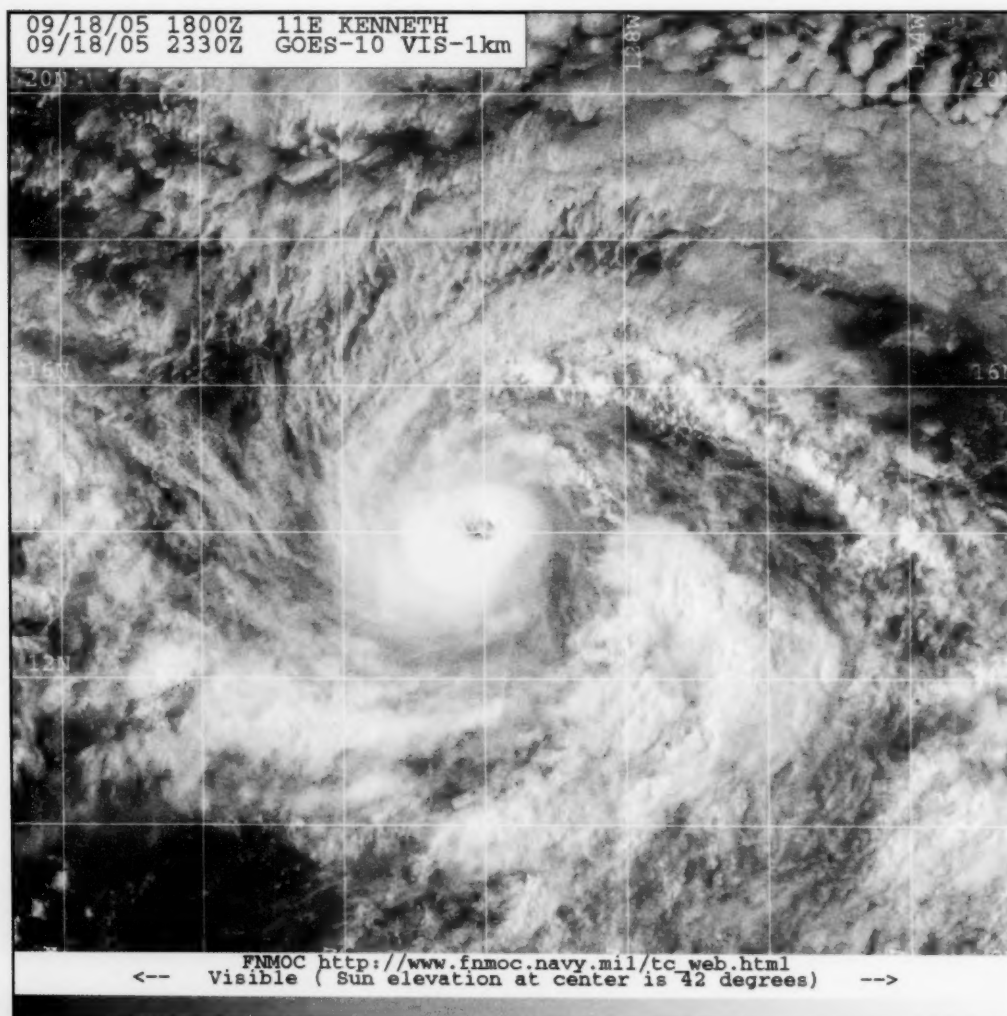


Figure 5. GOES-10 visible image of Hurricane Kenneth near peak intensity at 2330 UTC 18 September.

Image courtesy of the Fleet Numerical Meteorology and Oceanography Center, Monterey, CA.



Central America on 13 September. It became a tropical depression on 18 September about 500 nmi south-southwest of Cabo San Lucas (*Figure 1*). It reached tropical storm status later that day as it moved west-northwestward while absorbing the smaller circulation of Lidia. Max turned toward the northwest and strengthened on 19 September, and it reached hurricane intensity early on 20 September. Continuing northwestward, Max reached its estimated peak intensity of 75 kts later that day, but it soon began to weaken as it reached cooler waters. Max became a tropical storm and turned westward on 21 September, and it weakened to a tropical depression the next day. It degenerated to a remnant low later on 22 September about 700 nmi west of Cabo San Lucas. The low drifted southward for a few days and dissipated early on 26 September.

Tropical Storm Norma

Norma developed from a large tropical disturbance that lingered a few hundred nmi south of Manzanillo for several days. A tropical depression formed there early on 23 September and strengthened into a tropical storm later that day (*Figure 1*). Moving slowly to the west-northwest, Norma gradually developed despite modest northeasterly shear, and it reached its estimated peak intensity of 50 kts on 24 September. The vertical shear increased and gradually caused Norma to weaken, and it became a tropical depression late on 26 September. Deep convection faded as Norma moved over cooler waters, and the cyclone degenerated to a remnant low later the next day about 410 nmi west of Cabo San Lucas. The low moved slowly southwestward and finally dissipated about four days later.

Hurricane Otis

Otis originated from a tropical wave that moved westward from the coast of Africa on 9 September and that may have spawned Atlantic Hurricane Philippe. The wave reached the eastern North Pacific on 22 September and began to show signs of organization on 27 September. A tropical depression formed early the next day about 120 nmi south of Manzanillo (*Figure 1*). This depression was the sixth tropical cyclone to develop in the eastern North Pacific basin during the 17-day period starting on 12 September. The cyclone moved westward and became a tropical storm on 29 September. Otis turned northwestward and achieved hurricane status on 30 September, and it reached an estimated peak intensity of 90 kts on 1 October. It then weakened to a tropical storm the next day. A combination of low sea-surface temperatures and dry air caused continued weakening, and Otis became a depression on 3 October. It degenerated into a non-convective remnant low pressure area early on 4 October about 80 nmi northwest of Cabo San Lazaro, Mexico, and the low dissipated the next day.

Two ships reported tropical storm-force winds during Otis. The **Volendam** (PCHM) reported winds of 44 kts and a pressure of 1002.0 hPa at 0000 UTC 3 October, while the **Star Harmonia** (LAGB5) reported winds of 37 kts and a pressure of 1004.3 hPa at 0600 UTC 1 October.

While the core of Otis remained offshore, tropical storm-force winds occurred at higher elevations over portions of southern Baja California. An automated station at Cabo San Lucas (elevation 224 m) reported a 10-min average wind of 43 kts with a gust to 55 kts on 30 September.

Locally heavy rains also occurred over portions of the Baja California Peninsula. There were no reports of casualties or damages.

Tropical Depression Sixteen-E

The only cyclone of the 2005 eastern North Pacific season that did not become a tropical storm formed from a tropical wave that reached the basin on 13 October. Gradual organization occurred as the wave moved westward, and a tropical depression formed on 15 October about 360 nmi south of Acapulco (*Figure 2*). The cyclone moved west-northwestward for a couple of days, then turned westward on 17 October. The system weakened to a non-convective low early on 18 October, then it re-developed into a depression on 19 October about 675 nmi south-southwest of Cabo San Lucas. This second life was short-lived, with the depression again becoming a non-convective low on 20 October. The low was absorbed into the Intertropical Convergence Zone on 21 October about 800 nmi southwest of Cabo San Lucas.

Acknowledgments:

The cyclone summaries are based on reports prepared by the authors and the other Hurricane Specialists at the National Hurricane Center (NHC): James Franklin, Richard Pasch, and Stacy Stewart. Additional material was contributed by Tropical Prediction Center/NHC colleagues Eric Blake and David Roberts. Ethan Gibney prepared the season track map.



Mean Circulation Highlights and Climate Anomalies January through April 2006

A. James Wagner, Senior Forecaster, Climate Operations Branch, Climate Prediction Center /NCEP/NWS/NOAA.

January - February 2006

The circulation pattern over the Northern Hemisphere during January and February was characterized by strongly contrasting anomalies over the east Asian-Pacific sector and the Atlantic-Eurasian sector. From India eastward to the central Pacific, 500 hPa heights were above normal at middle and lower latitudes, while at high latitudes, especially from eastern Siberia across the Bering Sea to Alaska, heights were noticeably below normal. This resulted in strong westerlies at middle latitudes, with storms generally moving rapidly across the Pacific and most of the activity at higher middle latitudes. By contrast, from eastern North America to eastern Europe, 500 hPa heights were generally above normal at high latitudes and below normal at low latitudes. Storms were active over the western Atlantic, but tended to be displaced northeastward as they approached Europe, which was under the influence of abnormally cold anticyclones much of the time.

Thus, there was quite a contrast between the prevailing winter weather over North America and Eurasia. During January especially, record mild temperatures prevailed across much of the conterminous United States in the absence of any signifi-

cant Arctic air in a pattern that did not favor the generation of high pressure over Canada. Mild air of Pacific origin swept across the U.S. and southern Canada most of the time. Even though air approaching the West Coast did not originate over the tropical Pacific, strongly enhanced onshore flow and a slightly deeper than normal trough near the coast provided copious moisture that had the beneficial effect of eliminating the remaining long-term drought over the northwestern U.S. while building a deep mountain snow pack, but had the harmful result of producing repeated flooding from western Washington south as far as northern California.

Changes in the pattern from January to February allowed seasonably cold air to cover much of the lower 48 States during February. The high latitude blocking, which had been concentrated mainly over Eurasia during January, retrograded to the Greenland and Davis Strait area, allowing the buildup of Arctic highs over northern Canada, some of which made their way south to the U.S. by mid-February. One major snow storm affected the Northeast, with a record storm total of almost 27 in of snow measured at New York City's Central Park. Lake effect snow was also prevalent as Arctic air moved south

and southeast across the still open waters of the Great Lakes, which normally have their maximum ice cover by the end of February.

Alaska experienced a marked climate reversal between January and February. In January, low 500 hPa heights to the east and south and flow from northeastern Siberia and the Arctic Ocean kept moisture and milder Pacific air out of most of the state, resulting in colder and drier than normal weather. During February, the westerlies shifted abnormally far to the north, flooding even the interior of Alaska with relatively mild and moist air from the north Pacific and Bering Sea. This resulted in well above normal temperatures and heavier than normal precipitation over much of the state, most notably in the normally rather dry and cold Interior Basin area.

Extreme cold prevailed over western Russia and eastern Europe, especially in January, with subzero readings as far west as Germany. This caused most of the precipitation to fall as snow, which resulted in persistent snow cover, even though fair weather prevailed much of the time due to the abnormally strong upper level ridge and surface high pressure.

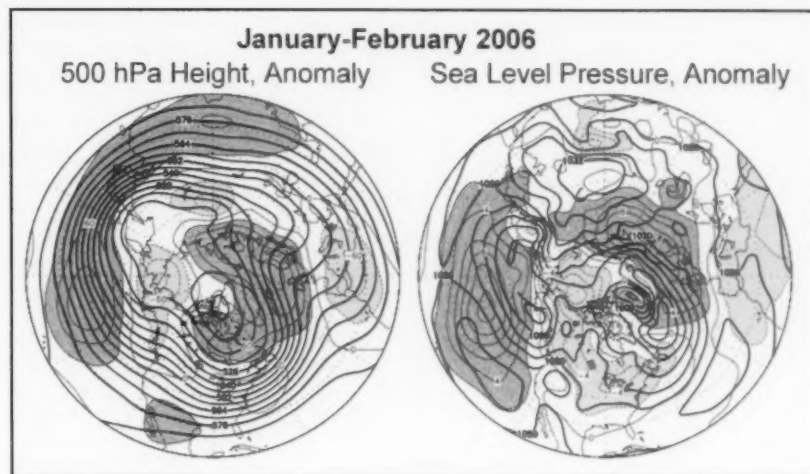
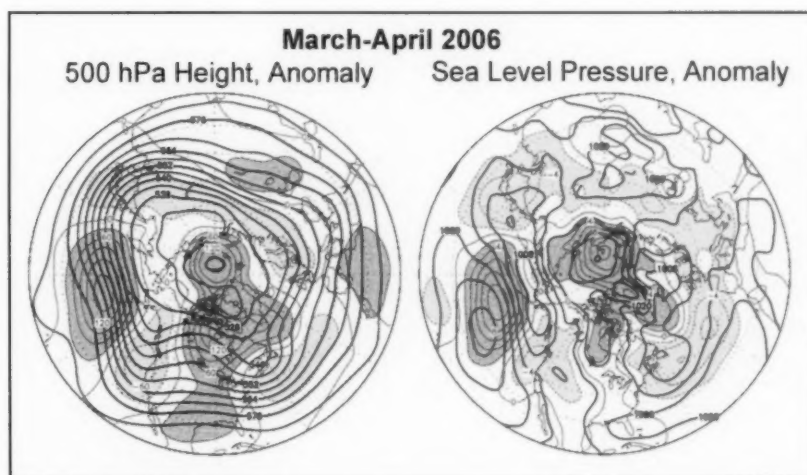


Figure legends and description of units:

The charts on the left show the seasonal mean 500 hPa height contours at 60 m intervals in heavy solid lines, with alternate contours labeled in decameters (dm). Positive height anomalies are contoured in light solid lines at 30 m intervals, and negative height anomalies are shown by light dashed lines. Areas of mean height anomalies greater than 30 m above normal have heavy shading, and areas of mean height anomalies of more than 30 m below normal have light shading.

The charts on the right show the seasonal mean sea level pressure (SLP) at 4 hPa intervals in heavy solid lines, labeled in hPa at selected intervals. Anomalies of SLP are contoured in light lines at 2 hPa intervals, with dark shading and solid lines in areas more than 2 hPa above normal, and light shading with dashed lines in areas greater than 2 mb below normal.





March - April 2006

During March and April, the phases of the AO and NAO were both negative, with anomalously high 500 hPa heights and sea level pressure covering much of the Arctic Basin, north-eastern Canada and Greenland. The Icelandic Low was split and there were two weak low pressure centers in the mean, one north of Scotland and the other near Newfoundland. Over the Pacific, the pattern was similar to that which prevailed during much of the preceding two-month period, with a large area of well above normal 500 hPa heights centered over the central North Pacific at middle latitudes. The trough over the eastern Pacific just off the west coast of North America became more amplified and the mean trough near Japan also strengthened. Storminess tended to be greatest over the western and eastern parts of the ocean, while cyclones crossing the central part of the Pacific did so at high latitudes and tended to move rapidly with the strong westerly flow. There is just a hint on the mean maps in the form of a weak low latitude trough at the 500 hPa level and a weak negative anomaly center on the sea level chart of the persistent Kona Lows that produced record-breaking heavy rains and floods in parts of Hawaii during March and early April.

A wide variety of spring weather was observed over the lower 48 States. Strong blocking over northern Canada

kept seasonably cool but very dry air over much of the middle Atlantic and New England areas, where many locations had their driest March on record. During April, the high latitude blocking moved to the Eurasian side of the Arctic, cold Arctic highs were few and weak over North America, and temperatures averaged well above normal over most of the lower 48 States east of the Rockies due to the virtual absence of Canadian air. With the stronger than normal trough near the West Coast persisting through most of both months, above normal precipitation fell over much of California and extended into the Great Basin, with flooding at times in northern and central California and heavy snows falling at higher elevations. The mean sea level pressure map shows an extension of lower than normal pressure southeastward across the Rockies and Great Plains from the trough near the coast. This feature reflected the occurrence of several major storm systems that brought heavy snow to parts of the central and northern Great Plains and severe thunderstorms with tornadoes, heavy rains and large hail to the southern Plains and parts of the Mississippi, Ohio and Tennessee Valleys. The precipitation had at least one beneficial effect in bringing welcome drought relief to some areas of the parched southern Plains, much of which had experienced record dryness from Fall 2005 into early Spring 2006.

The Tropics

The first four months of 2006 featured a gradual transition from weak La Nina conditions back to a neutral state. The east-west contrast of above normal temperatures over the western equatorial Pacific and below normal SSTs over the eastern and central Pacific weakened throughout the period. Most weather and climate impacts during this period were typical of La Nina, with heavy rains producing mudslides in parts of Indonesia, and several tropical storms, one of which reached Category 5 intensity, affecting Australia. The heavy rains over Hawaii and the northern and central Pacific coast of the lower 48 States with a sharp transition to dry weather in the interior Southwest were also typical of La Nina. However, the climate over the eastern U.S. was influenced more by variations in the location and strength of blocking over high latitudes, which affected both the amount of available cold air and the paths and intensity of winter storms over the eastern U.S.



VOS Program Awards

Chief Officer Pasko Matic (left) and Third Officer Mario Durasic (right) accept a 2005 VOS Annual Award on behalf of Master Petar Bozanic (not pictured) and the crew of the Atlanship *Orange Star*. The ship contributed more than 800 weather observations during its first 10 months in the program.

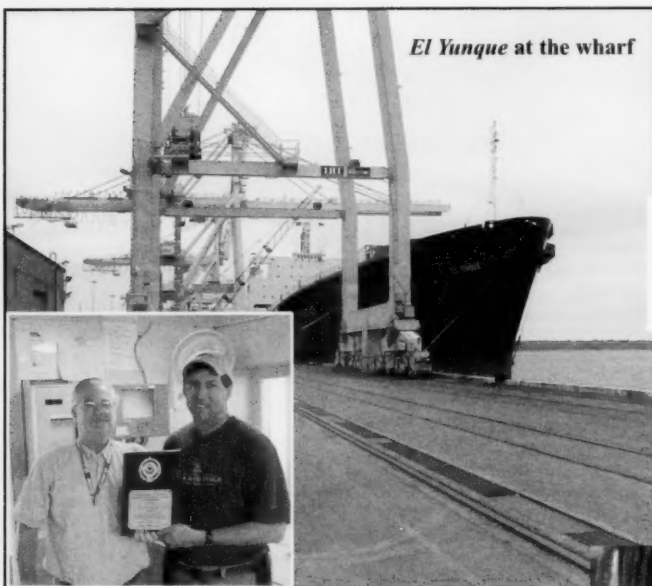


The crew of the *Edyth L* received a 2005 VOS Award. Pictured left to right receiving the award are Captain Geoff Walker, Second Mate G. Pastrona, Third Mate Eduardo Piniano, and Chief Mate I. Tatarczuk.

Photo courtesy of Baltimore PMO Jim Saunders

The Crowley Tug *Sinuk* received a VOS Award for providing an outstanding total of 969 observations in around 7 months of operations in Alaskan waters in 2005. Receiving the award for the *Sinuk* are, left to right, Captain Bernie Meier, Chief Mate Stephen Faust, and Second Mate Dave Hammitt.





El Yunque at the wharf

PMO Jack Warrelman (left) presented the *El Yunque* with a 2005 VOS Award. Chief Mate Mike Richie (right) received the award.

The *Liberty* received a 2005 VOS Award. Pictured from left to right receiving the award are Third Mate Eric Pickett, Captain Darren McGowan, and Second Mate Dan Taecki

Photo courtesy of Baltimore PMO Jim Saunders

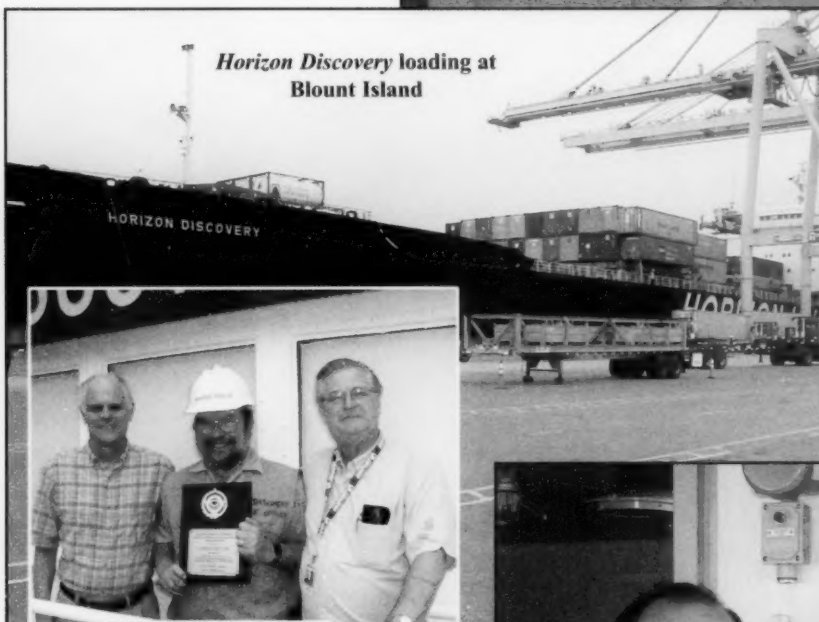


Accepting the Annual VOS Award on behalf of the crew of *Horizon Producer* are Captain Bill Boyce (left), Vessel Manager Wally Becker (center), and Chief Mate Steve Procida (right). Not pictured: Captain Don Cocozza, Chief Mate Chris Danilek, Second Mate Bob Anderson and Third Mate Pete Tupas. The crew of *Horizon Producer* transmitted 828 observations in 2005 enroute to winning their 4th consecutive VOS Award.

The *Bernardo Quintana A* was a 2005 VOS Award Recipient. Pictured left to right receiving the award are Captain Satish Hardas, Second Mate Felroy Menezes, Chief Officer P. Shobitt, and Third Mate M. Wadiwalla

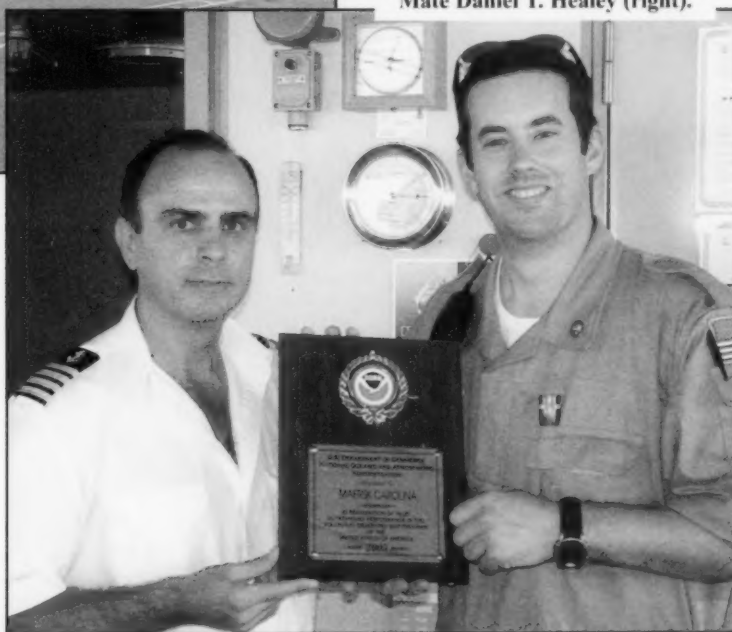


Horizon Discovery loading at Blount Island



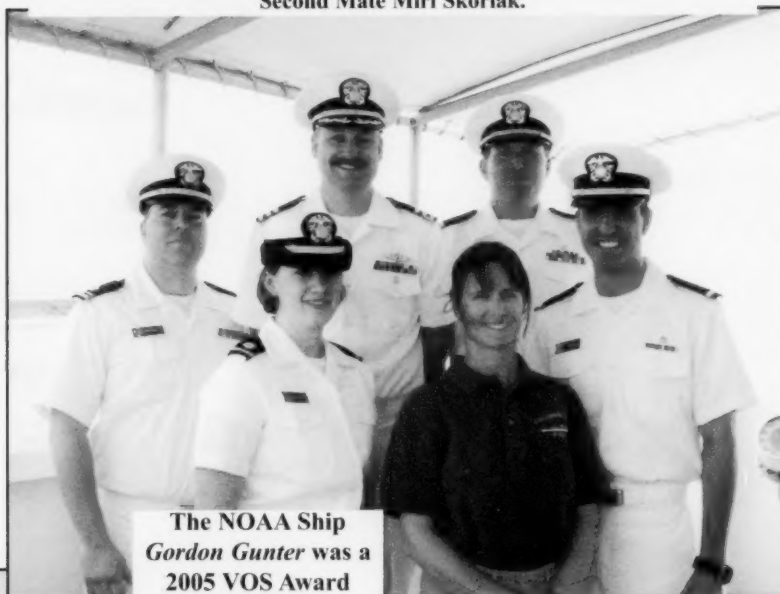
The *Maersk Carolina* received a 2005 VOS Award. Pictured accepting the award are Captain John J. Petronio (left) and Second Mate Daniel T. Healey (right).

PMO Jack Warrelman (right) presented the *Horizon Discovery* with a 2005 VOS Award. Captain John Hess (left) and Third Officer Bertil Haney recieved the award.





Pictured left to right - top row are LTJG Jonathan Taylor, Commanding Officer, CDR Jim Meigs, Executive Officer, LCDR Mike Ellis, LTJG Tony Perry III and bottom row ENS Victoria Zalewski and Operations Officer, Second Mate Miri Skoriak.



The NOAA Ship
Gordon Gunter was a
2005 VOS Award
recipient.



Pictured left to right are Executive Officer, LCDR Mike Ellis, Operations Officer, Second Mate Miri Skoriak, Commanding Officer, CDR Jim Meigs, ENS Victoria Zalewski, and LTJG Tony Perry III.

LTJG Priester, Operations Officer, accepts the 2005 VOS Award on behalf of the crew of the NOAA Ship *Delaware II*. Not pictured are LCDR Richard Wingrove, Commanding Officer, LT Jeffrey Taylor, Executive Officer, and ENS Fuenmayor, Navigator. *Delaware II* took over 825 quality weather observations during the year.



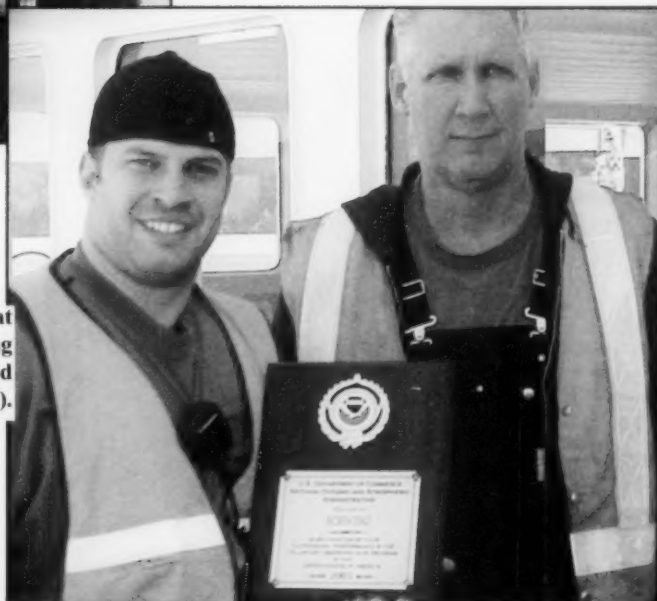


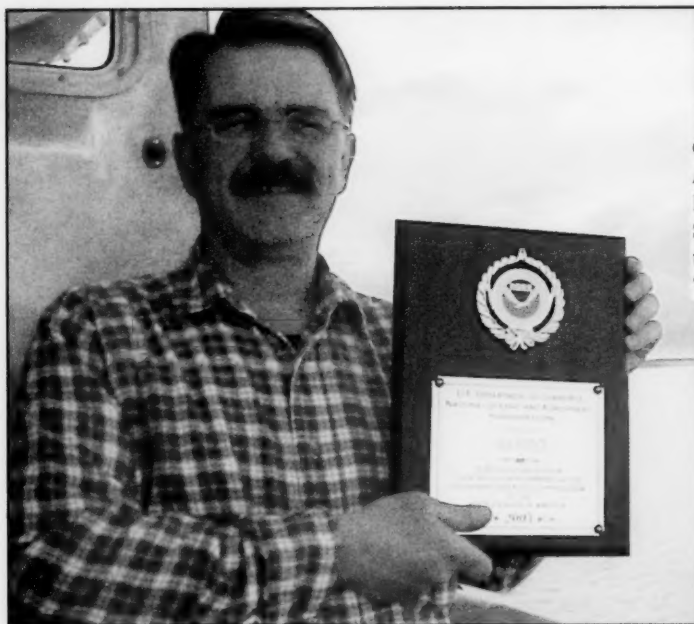
The *Horizon Tacoma* was presented with a 2005 VOS Award at the Port of Anchorage on May 2, 2006. On the left is Chief Cook Jioia de Leon with Chief Mate Mark Tuck on the right. The *Horizon Tacoma* had their best ever year for weather observations with 791.



The NOAA Ship *Oregon II* was a 2005 VOS Award recipient. Receiving the award left to right are GVA Vladimir Zgutnitski, F. Chuck Godwin, Commanding Officer, LCDR Jeremy Adams, ENS Paul Hemmick, LTJG Colin Little, ENS Raul Vasquez

The *North Star* was presented a 2005 VOS Award at the Port of Anchorage on May 30, 2006. Receiving the award are Third Mate Chris Ceasar (left) and Chief Mate Jonathan Boyce (right).





Captain Lanny Hansen of the Crowley Tug *Sea Prince* received a 2005 VOS Award while at the Port of Anchorage, Alaska on May 10, 2006. The *Sea Prince* had their best year ever in support of the Voluntary Observing Ships Program with 744 marine weather observations in 2005.

Ensign Tracy Hamburger (left) and LT(jg) Willima Wells (right) received a 2005 VOS Award for the *Nancy Foster*.



The *Midnight Sun* received a VOS Award at the Port of Anchorage, Alaska on June 4, 2006. Pictured left to right are Chief Mate Russell Horton, Anchorage Port Meteorological Officer Larry Hubble, Third Mate Christine Klimkowski, and Second Mate Michael Coffey. The *Midnight Sun* was ranked 16th among all National Weather Service Voluntary Observing Ships for 2005 with 1,003 observations. This was the *Midnight Sun*'s 2nd consecutive VOS Award and their best year ever.



VOS Awards



From left to right receiving the 2005 VOS Award for the *Seabulk Montana* are Thomas Blechschmidt, Captain Charles Parish, and AB Jeremy Arceneaux. The *Seabulk Montana* set a new all time ship's record with 1,438 observations in 2005. In addition, they sent many valuable ice observations and photographs from the Cook Inlet.

The *Horizon Kodiak* received a 2005 VOS Award while at the Port of Anchorage on April 18, 2006. The *Horizon Kodiak* had their best year ever with 912 weather observations. Pictured receiving the award is Chief Mate David Haa.



The *Charles Island* received a 2005 VOS Award. The crew submitted 551 observations in 2005. Receiving the award from left to right are Second Officer Gonzales Elner, Chief Officer Przenystan Liszek, and Captain Stanislan Mizcier. Not pictured is Third Officer Caprio Cezar.

VOS Awards



CP Liberator was presented the 2005 VOS Award for outstanding service in providing over 1,603, quality and timely marine weather observations. This is the third consecutive VOS Award the *CP Liberator* has earned. Pictured left to right receiving the award are Chief Mate Dan Martin, Captain Jeff Bridges, and PMO Chris Fakes.



CP Discoverer was presented the 2005 VOS Award for outstanding service in providing over 1,294, quality and timely marine weather observations. This is the seventh consecutive VOS Award the *CP Discoverer* has earned. Pictured left to right receiving the award are Chief Mate Pete Curtis, Chief Mate Mary Beth O'Brien, Captain Bob Febos, Chief Mate Klaus Luhta. Not pictured is Captain Billy Miles.

CP Navigator was presented the 2005 VOS Award for outstanding service in providing over 1,572 quality and timely marine weather observations. This is the third consecutive VOS Award the *CP Navigator* has earned. Pictured left to right receiving the award are Third Mate David Andrews, Captain John Farmer, and Second Mate Robert Newton. Although not pictured, the following people contributed a lot of effort, Captain Robert Strobel, Chief Mate Robert T. Kimball, Chief Mate Larry R. Mack, Chief Mate Klaus Luhta, Second Mate George Macdonough, Second Mate Thomas Lewis, Second Mate Rohit Malhotra, Second Mate Aaron Widerman, Third Mate Frank Gilroy, Third Mate Kenneth Kneisly, Third Mate Paul Sallee, and Third Mate Justin Zoeller.



Sealand Motivator was presented the 2005 VOS Award for outstanding service in providing over 961 quality and timely marine weather observations. This is the fourth consecutive VOS Award the *Sealand Motivator* has earned. Pictured left to right receiving the award are Captain John Finney, Captain Kevin O'Halloran, and Second Mate Craig Wallace.



Lykes Motivator (Livorno Express) was presented the 2005 VOS Award for outstanding service in providing over 778 quality and timely marine weather observations. This is the first VOS Award the *Lykes Motivator* has earned. Pictured left to right receiving the award are Captain Richard Johnson, Third Mate Roman Kasparyan, Chief Mate Marshall Townsend, Second Mate Gerard Dundon, and Cadet Keith Scott.

Sealand Pride was presented the 2005 VOS Award for outstanding service in providing over 1,063 quality and timely marine weather observations. This is the fourth consecutive VOS Award the *Sealand Pride* has earned. Pictured left to right receiving the award are Second Mate Kevin Cichon, Chief Mate John Kelly, Captain Pete Mitchell, and Third Mate Cole Patterson.





National Weather Service VOS Program New Recruits

From March 1, 2006 through June 30, 2006

Name of Ship	Call	Agent Name	Recruiting PMO
AIALIK BAY	KF004	AIALIK BAY C/O ALASKA SEALIFE CENTER	ANCHORAGE, AK
AKN CHALLENGER	9V5652	AKN CHALLENGER C/O NWS	KODIAK, AK
ALASKAN LEGEND	WDD2074	ALASKAN LEGEND C/O ALASKA TANKER CO.	VALDEZ, AK
ANDROMEDA LEADER	H8XD	NYK SHIP MANAGEMENT LTD	NEW YORK CITY, NY
AQUARIUS VOYAGER	C6UC3	CHEVRON-TEXACO SHIPPING COMPANY	JACKSONVILLE, FL
BOW HUNTER	9VMU9	BARWIL AGENCIES (N.A.) INC., BOB CONTRERAS	NEW YORK CITY, NY
CHISWELL ISLAND	KF005	CHISWELL ISLAND C/O ALASKA SEALIFE CENTER	ANCHORAGE, AK
COASTAL PROGRESS	WDC6363	COASTAL PROGRESS C/O COASTAL TRANSPORTATION	KODIAK, AK
CORDELIA	A8GQ8		MIAMI, FL
COSTA MAGICA	IBQQ	MAERSK BROKER K/S AGENCY	MIAMI, FL
DUBAI EXPRESS	VRBN8	NORTON LILY INTL. INC.	NORFOLK, VA
DYNAMIC VISION	C6FQ6	CHEVRON SHIPPING CO.	HOUSTON, TX
ELSEBETH	A8IO2	ELSEBETH C/O NWS	ANCHORAGE, AK
EURASIAN CHARIOT	DXSH		NEW YORK CITY, NY
FEDERAL MAAS	8POB	NSA AGENCIES	NEW ORLEANS, LA
GRAND COSMO	3EDQ	KERR NORTON STRACHAN, KENNY WONG	NEW YORK CITY, NY
GRETCHEN H.	WDC9138	TUG GRETCHEN H. C/O NORTHLAND SERVICES	KODIAK, AK
HANJIN ELIZABETH	H3PM	KNS AGENCY	NEW YORK CITY, NY
HATSU SMART	MLBD9		SEATTLE, WA
HENRY B. BIGELOW	WTDF	NOAA SHIP HENRY B. BIGELOW	NEW ORLEANS, LA
I.T. INTREPID	8PSH	I.T. INTREPID I.T. INTERNATIONAL TELECOM MARINE	ANCHORAGE, AK
KASIF KALKAVAN	V7IX7	TURKON AMERICA INC.	NORFOLK, VA
KUALA LUMPUR EXPRESS	SYGS	HAPAG-LLOYD(AMERICA) INC., 855 KEMPSVILLE ROAD	NORFOLK, VA
M/V PRAIRIE SKY	3FXK4	M/V PRAIRIE SKY C/O FRITZ MARITIME AGENCIES	NEW ORLEANS, LA
MAERSK DJIBOUTI	A8FN9	MAERSK INC.	NORFOLK, VA
MAERSK DORTMUND	9HZX7	KERR NORTON STRACHAN	NEW YORK CITY, NY
MAUMEE	WDA4649	GRAND RIVER NAVIGATION	CHICAGO, IL
MISS MARY	WDB3095	MISS MARY	VALDEZ, AK
MISS ROXANNE	WCX4992	MISS ROXANNE FISHERIES	VALDEZ, AK
MSC EMMA	HPXB	MSC N.A.	NEW YORK CITY, NY
MSC LORENA	3EBO9	MSC INC. N.A.	NEW YORK CITY, NY
NORWEGIAN STAR	C6FR3	NORWEGIAN STAR C/O NORWEGIAN CRUISE LINES	ANCHORAGE, AK
NORWEGIAN SUN	C6RN3	NORWEGIAN SUN C/O NORWEGIAN CRUISE LINES	ANCHORAGE, AK
OCEAN SOVEREIGN	HP6038	DIAMOND OFFSHORE DRILLING	HOUSTON, TX
OCEANA	ZCDN9	OCEANA C/O NWS	ANCHORAGE, AK
OVERSEAS AMBERMAR	WDC7019	INCHCAPE SHIPPING SERVICES	NORFOLK, VA
PACIFIC RELIANCE	WDC9368	PACIFIC RELIANCE C/O MARINE TRANSPORT CO.	KODIAK, AK
POLAR ENTERPRISE	WRTF	POLAR ENTERPRISE C/O POLAR TANKERS	NEW ORLEANS, LA
PT. OLIKTOK	WBM5091	PT. OLIKTOK C/O CROWLEY MARINE SERVICES	KODIAK, AK
ROWAN GORILLA VI	WCZ6545	ROWAN GORILLA VI C/O ROWAN COMPANIES INC.	ANCHORAGE, AK
SILKEBORG	EIJV		HOUSTON, TX
ST NICHOLAS	WDB8066	ST NICHOLAS FISHERIES	VALDEZ, AK
SYNERGY	WWF65	SYNERGY C/O NWS	KODIAK, AK
TALABOT	9V6487	T. PARKER HOST	NORFOLK, VA
VALDEZ STAR	WCO7674	VALDEZ STAR C/O CROWLEY MARINE SERVICES	VALDEZ, AK
WABASH	V7GJ2	OMI MARINE SERVICES	NEW YORK CITY, NY
WHITE SHARK	IBAI	INCHCAPE SHIPPING SERVICE SERVICES	NORFOLK, VA

47 More Recruits

Welcome Aboard & Thanks! — Luke



2005 Outstanding VOS Performers

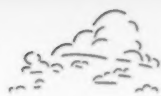
ALASKAN LEADER
ALTAIR VOYAGER
APL CHINA
ARCTIC SUN
BARRINGTON ISLAND
BERNARDO QUINTANA A.
CASON J. CALLAWAY
CHARLES ISLAND
CHESAPEAKE BAY
COASTAL RELIANCE
CP DISCOVERER
CP EAGLE
CP LIBERATOR
CP NAVIGATOR
DAVID STARR JORDAN
DEEPWATER HORIZON
DEEPWATER MILLENNIUM
DIANE H
DISCOVERER DEEP SEAS
DUNCAN ISLAND
EDYTH L
EL MORRO
EL YUNQUE
EMMA FOSS
ENDURANCE
FRANCES L
GEYSIR
GREEN LAKE
HMI BRENTON REEF
HOOD ISLAND
HORIZON ANCHORAGE
HORIZON CHALLENGER
HORIZON CRUSADER
HORIZON DISCOVERY
HORIZON HAWAII
HORIZON KODIAK
HORIZON PACIFIC
HORIZON PRODUCER
HORIZON RELIANCE
HORIZON TACOMA
HORIZON TRADER
ITB PHILADELPHIA
JAMES R. BARKER
JENS MAERSK
JUDY LITRICO
KENAI
LIBERTY
LIBERTY STAR

LYKES MOTIVATOR
MAERSK CAROLINA
MAERSK WIND
McKEE SONS
MEKONG PIONEER
MELVILLE
MIDNIGHT SUN
MOKIHANA
MONOA
MV MONTAUK
NEW HORIZON
NOAA SHIP ALBATROSS IV
NOAA SHIP DELAWARE II
NOAA SHIP GORDON GUNTER
NOAA SHIP NANCY FOSTER
NOAA SHIP OREGON II
NOAA SHIP OSCAR ELTON SETTE
NOAA SHIP RONALD H. BROWN
NORTH STAR
ORANGE STAR
PACIFIC CHALLENGER
PACIFIC RAVEN
PARAGON
PAUL R. TREGURTHA
PHYLLIS DUNLAP
POLAR ALASKA
POLAR EAGLE
ROGER REVELLE
SEA PRINCE
SEABULK MONTANA
SEA-LAND COMET
SEALAND COMMITMENT
SEALAND FLORIDA
SEA-LAND METEOR
SEALAND MOTIVATOR
SEALAND PATRIOT
SEALAND PRIDE
SELMA KALKAVAN
SINUK
STIMSON
STRONG PATRIOT
SUMIDA
UBC SAIKI
UNITED SPIRIT
WESTWOOD COLUMBIA
WESTWOOD RAINIER
WOLVERINE
YM GENOVA II



VOS Cooperative Ship Report: January through June 2006

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ADAM E. CORNELIUS	WCY9870	Chicago	0	0	0	15	0	0	0	0	0	0	0	0	15
ADVANTAGE	WPPO	Norfolk	0	8	46	25	12	14	0	0	0	0	0	0	105
ADVENTURER	WBN3015	Kodiak	0	0	0	0	1	0	0	0	0	0	0	0	1
AIALIK BAY	KF004	Anchorage	0	0	0	0	1	0	0	0	0	0	0	0	1
AKN CHALLENGER	9V5652	Kodiak	0	0	0	0	0	4	0	0	0	0	0	0	4
ALASKA MARINER	WSM5364	Kodiak	0	0	14	0	0	0	0	0	0	0	0	0	14
ALASKAN EXPLORER	WDB9918	Valdez	11	1	18	13	63	80	0	0	0	0	0	0	186
ALASKAN FRONTIER	WDB7815	Valdez	0	0	0	13	43	75	0	0	0	0	0	0	131
ALASKAN LEADER	WDB7918	Kodiak	23	28	1	0	0	10	0	0	0	0	0	0	62
ALASKAN NAVIGATOR	WDC6644	Valdez	10	25	33	25	10	41	0	0	0	0	0	0	144
ALBATROSS IV	WMVF	Norfolk	3	124	132	95	113	105	0	0	0	0	0	0	572
ALBEMARLE ISLAND	C6LU3	Miami	51	44	20	37	25	16	0	0	0	0	0	0	193
ALERT	WCZ7335	Valdez	19	21	8	15	27	14	0	0	0	0	0	0	104
ALKIN KALKAVAN	V7GY3	Norfolk	20	29	32	17	16	0	0	0	0	0	0	0	114
ALPENA	WAV4647	Chicago	0	0	18	27	27	20	0	0	0	0	0	0	92
ALTAIR VOYAGER	C6OK	Baltimore	39	38	18	35	13	37	0	0	0	0	0	0	180
AMERICA FEEDER	A8FK5	Miami	0	0	0	0	0	23	0	0	0	0	0	0	23
AMERICAN REPUBLIC	WYR5386	Chicago	0	0	0	0	3	4	0	0	0	0	0	0	7
AMSTERDAM	PBAD	Anchorage	47	87	148	318	165	0	0	0	0	0	0	0	765
ANTARES VOYAGER	C6PZ3	Oakland	69	67	15	27	59	38	0	0	0	0	0	0	275
APL ALEXANDRITE	9VBA	Oakland	67	8	30	26	15	11	0	0	0	0	0	0	157
APL AMAZONITE	9VBX	Long Beach	59	41	56	47	47	55	0	0	0	0	0	0	305
APL CANADA	A8CG6	Oakland	62	45	34	38	63	37	0	0	0	0	0	0	279
APL CHINA	WDB3161	Long Beach	36	40	61	61	53	26	0	0	0	0	0	0	277
APL DALIAN	S6HU6	Norfolk	0	37	37	13	6	3	0	0	0	0	0	0	96
APL JADE	9VVD	New York City	2	0	38	35	40	47	0	0	0	0	0	0	162
APL JAPAN	S6TS	Seattle	82	45	45	55	49	38	0	0	0	0	0	0	314
APL KENNEDY	9VAY4	Seattle	55	50	51	19	57	22	0	0	0	0	0	0	254
APL KOREA	WCX8883	Long Beach	46	18	28	30	51	50	0	0	0	0	0	0	223
APL NEW YORK	A8GS3	New York City	15	38	37	44	37	32	0	0	0	0	0	0	203
APL PERU	V2OE2	New York City	41	35	43	52	13	13	0	0	0	0	0	0	197
APL PHILIPPINES	WCX8884	Long Beach	0	0	23	34	35	39	0	0	0	0	0	0	131
APL SINGAPORE	WCX8812	Long Beach	39	50	62	34	49	61	0	0	0	0	0	0	295
APL SWEDEN	9VYY5	Seattle	7	63	37	47	55	62	0	0	0	0	0	0	271
APL THAILAND	WCX8882	Long Beach	37	26	22	44	40	27	0	0	0	0	0	0	196
APL TURQUOISE	9VYY	Oakland	28	32	19	25	20	7	0	0	0	0	0	0	131
APL VIRGINIA	A8HA3	New York City	0	0	0	0	0	33	0	0	0	0	0	0	33
AQUARIUS VOYAGER	C6UC3	Jacksonville	0	0	33	28	40	36	0	0	0	0	0	0	137
ARCTIC OCEAN	C6T2062	New York City	0	35	39	33	37	18	0	0	0	0	0	0	162
ARCTIC SUN	ELQB8	Anchorage	508	366	261	289	372	411	0	0	0	0	0	0	2207
ARGONAUT	KFDV	New York City	0	0	0	0	0	13	0	0	0	0	0	0	13
ARIZONA VOYAGER	KGBE	Miami	0	0	20	58	35	11	0	0	0	0	0	0	124
ARTHUR M. ANDERSON	WE4805	Chicago	40	0	5	32	34	26	0	0	0	0	0	0	137
ASPHALT COMMANDER	WFJN	New Orleans	23	9	7	0	17	45	0	0	0	0	0	0	101
ATLANTIC CARTIER	SCKB	Norfolk	39	25	45	41	28	34	0	0	0	0	0	0	212
ATLANTIC OCEAN	C6T2064	New York City	32	42	31	35	19	29	0	0	0	0	0	0	188
ATLANTIS	KAQP	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
ATTENTIVE	WCZ7337	Valdez	22	9	11	33	13	11	0	0	0	0	0	0	99
AVIK	WDB7888	Kodiak	0	0	0	0	18	10	0	0	0	0	0	0	28



VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AWARE	WCZ7336	Valdez	13	26	17	8	16	25	0	0	0	0	0	0	105
BARBARA ANDRIE	WTC9407	Chicago	3	0	0	0	2	0	0	0	0	0	0	0	5
BARBARA MCALLISTER	WCY7761	Kodiak	0	0	6	0	3	1	0	0	0	0	0	0	10
BARRINGTON ISLAND	C6QK	Miami	79	64	90	68	90	93	0	0	0	0	0	0	484
BARROW RESEARCH	KCB53	Anchorage	0	0	0	24	26	25	0	0	0	0	0	0	75
BENGAL SEA	ELPL3	New York City	54	0	28	75	0	8	0	0	0	0	0	0	165
BERING LEADER	WDC7227	Kodiak	13	37	29	0	0	0	0	0	0	0	0	0	79
BERING SEA	C6YY	Miami	0	0	40	61	41	47	0	0	0	0	0	0	189
BERNARDO QUINTANA A	C6KJ5	New Orleans	65	49	70	62	68	53	0	0	0	0	0	0	367
BESIRE KALKAVAN	V7GY4	Norfolk	1	2	44	38	25	24	0	0	0	0	0	0	134
BOW HUNTER	9VMU9	New York City	0	0	9	21	0	0	0	0	0	0	0	0	30
BREEZE ARROW	LAOT4	Seattle	64	47	57	54	22	0	0	0	0	0	0	0	244
BRUCE	WWU8	Anchorage	8	3	7	3	12	4	0	0	0	0	0	0	37
BUCCANEER	WYW5588	Valdez	7	1	0	16	1	1	0	0	0	0	0	0	26
BUFFALO	WXS6134	Chicago	0	0	0	4	26	2	0	0	0	0	0	0	32
BULWARK	WBN4113	Valdez	0	2	24	38	1	15	0	0	0	0	0	0	80
BURNS HARBOR	WDC6027	Chicago	0	0	0	11	0	0	0	0	0	0	0	0	11
CAJUN EXPRESS	ELXL3	Houston	52	2	5	0	0	0	0	0	0	0	0	0	59
CAMAI	KF003	Kodiak	0	3	24	28	20	59	0	0	0	0	0	0	134
CANBERRA EXPRESS	VSUA7	Anchorage	22	17	20	1	1	0	0	0	0	0	0	0	61
CARNIVAL CONQUEST	3FPQ9	New Orleans	27	186	99	43	36	16	0	0	0	0	0	0	407
CARNIVAL DESTINY	C6FN4	Miami	8	25	9	8	1	1	0	0	0	0	0	0	52
CARNIVAL FANTASY	H3GS	Jacksonville	0	52	45	44	12	27	0	0	0	0	0	0	180
CARNIVAL GLORY	3FPS9	Jacksonville	0	5	3	1	2	3	0	0	0	0	0	0	14
CARNIVAL HOLIDAY	C6FM6	New Orleans	0	0	1	11	17	22	0	0	0	0	0	0	51
CARNIVAL LEGEND	H3VT	Miami	16	7	0	6	5	46	0	0	0	0	0	0	80
CARNIVAL LIBERTY	HPYE	Miami	0	10	13	15	7	0	0	0	0	0	0	0	45
CARNIVAL MIRACLE	H3VS	Miami	10	2	0	6	5	3	0	0	0	0	0	0	26
CARNIVAL PRIDE	H3VU	Miami	1	0	0	7	3	1	0	0	0	0	0	0	12
CARNIVAL SPIRIT	3FPR9	Anchorage	1	0	0	0	0	2	0	0	0	0	0	0	3
CARNIVAL TRIUMPH	C6FN5	Miami	39	41	16	8	12	24	0	0	0	0	0	0	140
CARNIVAL VALOR	H3VR	Miami	29	22	5	3	0	2	0	0	0	0	0	0	61
CARNIVAL VICTORY	3FFL8	Miami	31	27	37	28	42	37	0	0	0	0	0	0	202
CAROLINE MAERSK	OZWA2	Seattle	0	0	0	61	0	0	0	0	0	0	0	0	61
CARSTEN MAERSK	OZYB2	Seattle	18	0	0	0	0	0	0	0	0	0	0	0	18
CASON J. CALLAWAY	WE4879	Chicago	0	0	9	36	97	112	0	0	0	0	0	0	254
CELEBRATION	H3GQ	Jacksonville	0	0	9	10	18	2	0	0	0	0	0	0	39
CELTIC SEA	C6RT	Miami	24	20	24	29	49	9	0	0	0	0	0	0	155
CENTURY	C6FU5	Miami	3	0	0	0	0	0	0	0	0	0	0	0	3
CERAM SEA	9VHB9	New Orleans	18	9	21	0	0	2	0	0	0	0	0	0	50
CHARLES ISLAND	C6JT	Miami	33	30	29	34	42	28	0	0	0	0	0	0	196
CHARLES M. BEEGHLEY	WL3108	Chicago	4	0	0	14	14	7	0	0	0	0	0	0	39
CHARLOTTE MAERSK	OWLD2	Seattle	20	25	0	0	18	20	0	0	0	0	0	0	83
CHEMICAL EXPLORER	KRGC	Houston	6	28	0	4	23	60	0	0	0	0	0	0	121
CHEMICAL PIONEER	KAFO	Houston	0	1	0	2	16	0	0	0	0	0	0	0	19
CHEMICAL TRADER	KRGJ	Houston	17	12	2	0	16	14	0	0	0	0	0	0	61
CHEROKEE BRIDGE	V7FW7	New York City	18	56	50	62	54	51	0	0	0	0	0	0	291
CHESAPEAKE BAY	WMLH	Norfolk	26	31	40	42	45	30	0	0	0	0	0	0	214
CHESAPEAKE BAY BRIDGE	V7FW8	New York City	20	37	30	41	18	48	0	0	0	0	0	0	194
CHINOOK	WCY2791	Kodiak	0	0	0	0	4	0	0	0	0	0	0	0	4
CLEVELAND	KGXA	Houston	86	33	41	15	25	2	0	0	0	0	0	0	202
CLIFFORD MAERSK	OYRO2	Seattle	52	0	45	19	0	0	0	0	0	0	0	0	116
COASTAL NAVIGATOR	WCY9686	Seattle	0	0	0	0	1	0	0	0	0	0	0	0	1
COASTAL NOMAD	WSK2703	Kodiak	0	0	0	0	0	1	0	0	0	0	0	0	1

VOS Cooperative Ship Report



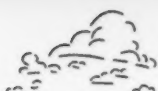
Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
COASTAL PILOT	WBP7281	Kodiak	0	0	0	0	2	0	0	0	0	0	0	0	2
COASTAL RELIANCE	WADZ	Kodiak	58	57	64	47	53	5	0	0	0	0	0	0	284
COASTAL TRADER	WSL8560	Kodiak	0	0	3	0	1	0	0	0	0	0	0	0	4
COLD BAY RESEARCH	KCI95	Anchorage	6	0	7	1	1	0	0	0	0	0	0	0	15
COLLIER BROTHERS	WUU7551	Valdez	4	0	0	0	1	0	0	0	0	0	0	0	5
COLORADO VOYAGER	KLHZ	Oakland	0	0	0	0	1	0	0	0	0	0	0	0	1
COLUMBINE MAERSK	OUHC2	Seattle	0	11	46	0	14	0	0	0	0	0	0	0	71
CONDOR	PJWQ	New York City	12	22	7	0	0	0	0	0	0	0	0	0	41
COPENHAGEN EXPRESS	ZCDP2	Charleston	16	47	22	32	24	15	0	0	0	0	0	0	156
CORAL SEA	C6YW	Miami	10	32	23	9	1	0	0	0	0	0	0	0	75
CORBIN FOSS	WDB5265	Kodiak	0	0	12	67	21	50	0	0	0	0	0	0	150
CORDELIA	A8GQ8	Miami	0	0	0	0	0	27	0	0	0	0	0	0	27
CORNELIA MAERSK	OWWS2	Seattle	46	3	4	46	0	26	0	0	0	0	0	0	125
CORWITH CRAMER	WTF3319	Kodiak	0	40	23	14	0	0	0	0	0	0	0	0	77
COSTA MAGICA	IBQQ	Miami	0	0	0	0	38	0	0	0	0	0	0	0	38
COURAGE	WDC6907	Baltimore	26	14	22	25	26	7	0	0	0	0	0	0	120
COURTNEY BURTON	WE6970	Chicago	0	0	0	0	1	0	0	0	0	0	0	0	1
COURTNEY L	ZCAQ8	Baltimore	55	49	39	55	20	22	0	0	0	0	0	0	240
CP DISCOVERER	WGXO	Houston	112	38	62	66	57	61	0	0	0	0	0	0	396
CP EVERGLADES	ZIYE7	Houston	1	11	6	10	14	8	0	0	0	0	0	0	50
CP LIBERATOR	WGXN	Houston	133	121	93	106	169	96	0	0	0	0	0	0	718
CP NAVIGATOR	WGMJ	Houston	100	204	157	159	125	177	0	0	0	0	0	0	922
CROSS POINT	WDA3423	Kodiak	0	0	0	16	11	6	0	0	0	0	0	0	33
CSCL MELBOURNE	VRB18	Norfolk	0	0	0	0	4	0	0	0	0	0	0	0	4
CSCL NEW YORK	VRBH7	Norfolk	45	0	29	0	40	9	0	0	0	0	0	0	123
CSCL XIAMEN	A8CL6	Norfolk	0	0	0	0	0	0	0	0	0	0	0	0	0
CSL CABO	D5XH	Seattle	22	35	3	3	0	0	0	0	0	0	0	0	63
DAIO ANDES	3FDN9	Anchorage	1	49	49	67	58	89	0	0	0	0	0	0	313
DAISHIN MARU	3FPS6	Seattle	0	0	5	0	0	0	0	0	0	0	0	0	5
DAVID FOSS	WYQ8110	Kodiak	0	0	3	8	19	23	0	0	0	0	0	0	53
DAVID STARR JORDAN	WTDK	Long Beach	1	120	4	81	60	71	0	0	0	0	0	0	337
DEEPWATER HORIZON	V7HC9	Houston	85	139	97	133	108	82	0	0	0	0	0	0	644
DEEPWATER MILLENNIUM	V7HD2	Houston	112	80	86	60	80	78	0	0	0	0	0	0	496
DELAWARE II	KNBD	New York City	56	41	56	65	3	46	0	0	0	0	0	0	267
DELAWARE TRADER	WDB3258	Houston	59	41	30	37	30	66	0	0	0	0	0	0	263
DENALI	WSVR	Long Beach	14	8	6	23	70	45	0	0	0	0	0	0	166
DIANE H.	WUR7250	Kodiak	0	0	0	0	0	31	0	0	0	0	0	0	31
DIRCH MAERSK	OXQP2	Long Beach	7	31	52	36	25	16	0	0	0	0	0	0	167
DIRECT TUI	ELVZ5	Norfolk	671	518	27	5	0	0	0	0	0	0	0	0	1221
DISCOVERER DEEP SEAS	V7HC6	New Orleans	33	25	34	35	30	23	0	0	0	0	0	0	180
DISCOVERER ENTERPRISE	V7HD3	New Orleans	6	2	43	22	55	62	0	0	0	0	0	0	190
DISCOVERER SPIRIT	V7HC8	Houston	0	0	0	0	112	98	0	0	0	0	0	0	210
DISNEY MAGIC	C6PT7	Jacksonville	0	1	2	2	8	0	0	0	0	0	0	0	13
DREW FOSS	WYL5718	Kodiak	9	9	13	21	0	16	0	0	0	0	0	0	68
DUBAI EXPRESS	VRBN8	Norfolk	0	0	24	13	37	15	0	0	0	0	0	0	89
DUNCAN ISLAND	C6JS	Miami	19	7	29	45	38	45	0	0	0	0	0	0	183
DYNAMIC VISION	C6FQ6	Houston	0	0	0	32	0	12	0	0	0	0	0	0	44
EARL W. OGLEBAY	WZE7718	Chicago	0	0	0	0	0	1	0	0	0	0	0	0	1
ECSTASY	H3GR	Miami	0	0	0	5	12	12	0	0	0	0	0	0	29
EDGAR B. SPEER	WQZ9670	Chicago	0	0	1	1	89	63	0	0	0	0	0	0	154
EDWIN H. GOTT	WXQ4511	Chicago	0	0	0	0	25	24	0	0	0	0	0	0	49
EDYTH L	ZCAM4	Baltimore	44	45	58	54	69	69	0	0	0	0	0	0	339
EL FARO	WFJK	Jacksonville	0	0	0	22	27	30	0	0	0	0	0	0	79
EL MORRO	KCGH	Jacksonville	35	35	36	52	54	55	0	0	0	0	0	0	267



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EL YUNQUE	WGJT	Jacksonville	32	26	38	63	73	1	0	0	0	0	0	0	233
ELATION	3FOC5	Miami	12	7	13	4	1	4	0	0	0	0	0	0	41
ELSEBETH	A8IO2	Anchorage	0	0	0	45	4	0	0	0	0	0	0	0	49
EMMA FOSS	WCF3931	Kodiak	0	0	6	47	67	42	0	0	0	0	0	0	162
EMPIRE STATE	KKFW	New York City	0	0	0	0	41	76	0	0	0	0	0	0	117
EMPRESS OF THE SEAS	C6SE6	Miami	4	4	0	0	6	20	0	0	0	0	0	0	34
ENDURANCE	WDA3359	Valdez	9	12	10	11	25	27	0	0	0	0	0	0	94
EVER DECENT	3FUO7	New York City	4	4	2	3	2	0	0	0	0	0	0	0	15
EVER DELIGHT	3FCB8	New York City	0	0	8	2	0	2	0	0	0	0	0	0	12
EVER DEVELOP	3FLF8	New York City	11	1	10	6	8	8	0	0	0	0	0	0	44
EVER DIADEM	3FOF8	New York City	0	1	2	1	0	0	0	0	0	0	0	0	4
EVER DIVINE	3FSA8	Norfolk	7	5	7	5	2	9	0	0	0	0	0	0	35
EVER REACH	3FQO4	New York City	15	8	17	22	8	27	0	0	0	0	0	0	97
EVER RENOWN	3FFR4	Long Beach	12	7	8	5	1	0	0	0	0	0	0	0	33
EVER RESULT	3FSA4	New York City	0	0	0	0	6	4	0	0	0	0	0	0	10
EVER UBERTY	3FAG9	Seattle	0	0	0	0	0	14	0	0	0	0	0	0	14
EVER UNION	3FFG7	Seattle	21	11	10	15	3	0	0	0	0	0	0	0	60
EVER UNIQUE	3FXQ6	Seattle	0	0	0	1	1	0	0	0	0	0	0	0	2
EVER UNISON	3FTL6	Seattle	1	0	4	6	0	0	0	0	0	0	0	0	11
EVER UNITED	3FMQ6	Seattle	0	0	6	0	0	6	0	0	0	0	0	0	12
EVER URANUS	3FCA9	Seattle	7	0	0	2	0	3	0	0	0	0	0	0	12
EVER USEFUL	3FCC9	Anchorage	0	6	0	2	0	0	0	0	0	0	0	0	8
EVER UTILE	3FZA9	Seattle	0	0	0	0	4	0	0	0	0	0	0	0	4
EXPLORER OF THE SEAS	ELWX5	Miami	67	154	193	282	225	257	0	0	0	0	0	0	1178
FAIRWEATHER	WTEB	Anchorage	21	0	0	6	69	65	0	0	0	0	0	0	161
FASCINATION	C6FM9	Miami	2	0	0	5	6	9	0	0	0	0	0	0	22
FEDERAL HUNTER	VRWP2	New Orleans	0	0	12	3	0	0	0	0	0	0	0	0	15
FEDERAL MAAS	8POB	New Orleans	0	0	0	0	2	2	0	0	0	0	0	0	4
FIGARO	S6PI	Baltimore	0	0	22	30	0	0	0	0	0	0	0	0	52
FISHHAWK	WRB5085	Kodiak	0	0	0	0	33	3	0	0	0	0	0	0	36
FRANCES L	ZCAM5	Baltimore	26	21	21	32	40	33	0	0	0	0	0	0	173
FREEDOM	WDB5483	Baltimore	0	0	15	43	38	33	0	0	0	0	0	0	129
FREMANTLE EXPRESS	VSXC7	Anchorage	3	0	0	10	8	12	0	0	0	0	0	0	33
GALAXY	C6FU6	Miami	0	0	0	6	0	0	0	0	0	0	0	0	6
GALE WIND	WAZ9548	Kodiak	0	0	0	8	20	11	0	0	0	0	0	0	39
GEMINI VOYAGER	C6FE5	Long Beach	8	28	9	0	0	0	0	0	0	0	0	0	45
GENE DUNLAP	WAS2433	Kodiak	0	1	1	0	0	0	0	0	0	0	0	0	2
GEYSIR	WCZ5528	Norfolk	10	0	24	37	44	55	0	0	0	0	0	0	170
GLADIATOR	WCZ9000	Kodiak	0	0	0	0	0	4	0	0	0	0	0	0	4
GLOBAL SENTINEL	WRZU	Baltimore	0	0	0	3	0	0	0	0	0	0	0	0	3
GLOIRE	3FPA6	Seattle	64	57	0	70	52	0	0	0	0	0	0	0	243
GOLDEN BEAR	NMRY	Oakland	0	0	0	0	49	59	0	0	0	0	0	0	108
GORDON GUNTER	WTEO	New Orleans	0	0	140	92	164	71	0	0	0	0	0	0	467
GREAT LAND	WFDP	Seattle	41	32	14	20	52	30	0	0	0	0	0	0	189
GREEN BRAZIL	V2RE	Baltimore	0	0	49	41	62	63	0	0	0	0	0	0	215
GREEN DALE	WCZ5238	Jacksonville	56	68	72	56	13	43	0	0	0	0	0	0	308
GREEN LAKE	WDDI	Baltimore	10	12	26	29	41	13	0	0	0	0	0	0	131
GREEN POINT	WCY4148	New York City	2	0	0	0	0	0	0	0	0	0	0	0	2
GRETA	WCY2853	Kodiak	0	0	0	0	13	3	0	0	0	0	0	0	16
GRETCHEN H.	WDC9138	Kodiak	0	0	0	5	11	3	0	0	0	0	0	0	19
GROTON	KMJL	New York City	12	4	15	23	3	0	0	0	0	0	0	0	57
GSF EXPLORER	WCX5333	New Orleans	0	42	40	4	48	80	0	0	0	0	0	0	214
GUARDIAN	WBO2511	Kodiak	0	0	1	0	0	0	0	0	0	0	0	0	1
GUARDSMAN	WBN5978	Kodiak	91	40	29	48	53	38	0	0	0	0	0	0	299

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GULF TITAN	WDA5598	Kodiak	2	8	12	16	0	4	0	0	0	0	0	0	42
GYR FALCON	WCU6587	Kodiak	0	0	4	7	0	0	0	0	0	0	0	0	11
H. LEE WHITE	WZD2465	Chicago	0	0	0	0	10	0	0	0	0	0	0	0	10
HANJIN OTTAWA	DANM	Anchorage	86	69	83	57	46	32	0	0	0	0	0	0	373
HANJIN SHANGHAI	3FGI5	New York City	10	12	11	30	33	19	0	0	0	0	0	0	115
HANSA CENTURY	DHHI	New York City	17	4	0	0	0	0	0	0	0	0	0	0	21
HANSA RENDSBURG	A8CF4	Anchorage	80	78	88	73	70	55	0	0	0	0	0	0	444
HANSA VISBY	ELWR5	Anchorage	55	44	53	53	58	47	0	0	0	0	0	0	310
HATSU EAGLE	ZNZH6	Seattle	0	0	0	7	0	0	0	0	0	0	0	0	7
HATSU ELITE	VSJG7	Seattle	56	53	47	33	47	39	0	0	0	0	0	0	275
HATSU ENVOY	VSQJ9	Seattle	21	14	0	16	19	20	0	0	0	0	0	0	90
HATSU ETHIC	VQFS4	Seattle	12	15	21	22	32	20	0	0	0	0	0	0	122
HATSU EXCEL	VSXV3	Seattle	17	12	19	16	18	14	0	0	0	0	0	0	96
HATSU SIGMA	MKKZ7	Seattle	10	7	15	11	9	3	0	0	0	0	0	0	55
HATSU SMART	MLBD9	Seattle	0	0	0	0	17	0	0	0	0	0	0	0	17
HERCULES	WBN2074	Kodiak	0	0	0	42	25	19	0	0	0	0	0	0	86
HI'IALAKAI	WTEY	Honolulu	51	54	57	45	80	57	0	0	0	0	0	0	344
HMI BRENTON REEF	WCY8453	Anchorage	15	50	34	36	52	31	0	0	0	0	0	0	218
HONOR	WDC6923	Baltimore	11	17	36	7	16	28	0	0	0	0	0	0	115
HOOD ISLAND	C6LU4	Miami	27	38	46	43	43	57	0	0	0	0	0	0	254
HORIZON ENTERPRISE	KRGB	Oakland	508	601	671	356	682	652	0	0	0	0	0	0	3470
HORIZON ANCHORAGE	KGTX	Anchorage	196	170	198	189	199	278	0	0	0	0	0	0	1230
HORIZON CHALLENGER	WZJC	Jacksonville	82	75	86	48	59	43	0	0	0	0	0	0	393
HORIZON CONSUMER	WCHF	Long Beach	24	2	29	21	37	39	0	0	0	0	0	0	152
HORIZON CRUSADER	WZJF	Jacksonville	32	35	29	0	0	0	0	0	0	0	0	0	96
HORIZON DISCOVERY	WZJD	Jacksonville	38	19	2	25	44	42	0	0	0	0	0	0	170
HORIZON FAIRBANKS	WPGJ	Anchorage	57	62	61	34	0	47	0	0	0	0	0	0	261
HORIZON HAWAII	KIRF	New York City	69	50	70	40	62	75	0	0	0	0	0	0	366
HORIZON KODIAK	KGTX	Anchorage	59	56	60	55	49	50	0	0	0	0	0	0	329
HORIZON NAVIGATOR	WPGK	Long Beach	50	39	65	38	34	49	0	0	0	0	0	0	275
HORIZON PACIFIC	WSRL	Long Beach	53	45	0	52	75	66	0	0	0	0	0	0	291
HORIZON PRODUCER	WBJB	New York City	66	69	75	77	71	74	0	0	0	0	0	0	432
HORIZON RELIANCE	WFLH	Long Beach	6	63	85	74	90	83	0	0	0	0	0	0	401
HORIZON SPIRIT	WFLG	Oakland	47	55	64	74	81	76	0	0	0	0	0	0	397
HORIZON TACOMA	KGTY	Anchorage	124	63	59	70	65	55	0	0	0	0	0	0	436
HORIZON TRADER	KIRH	Oakland	57	44	60	69	65	74	0	0	0	0	0	0	369
HOUSTON	KCDK	Houston	52	9	6	17	22	0	0	0	0	0	0	0	106
HYUNDAI GARNET	9VVN	New York City	43	16	42	59	54	73	0	0	0	0	0	0	287
I.T. INTREPID	8PSH	Anchorage	0	0	0	108	85	0	0	0	0	0	0	0	193
IMAGINATION	C6FN2	Miami	0	6	26	20	20	7	0	0	0	0	0	0	79
INDEPENDENCE	WRYG	Baltimore	4	33	33	39	5	0	0	0	0	0	0	0	114
INDIAN OCEAN	C6T2063	New York City	33	29	9	12	8	37	0	0	0	0	0	0	128
INDIANA HARBOR	WXN3191	Chicago	0	0	10	79	123	139	0	0	0	0	0	0	351
INDOTRANS CELEBES	VRZN9	Norfolk	0	15	47	48	8	45	0	0	0	0	0	0	163
INDOTRANS MAKASSA	VRZO2	New Orleans	0	0	0	0	32	68	0	0	0	0	0	0	100
INDUSTRIAL CHALLENGER	WDHL	Norfolk	0	0	0	0	23	28	0	0	0	0	0	0	51
INLAND SEAS	WCJ6214	Chicago	0	0	0	0	2	0	0	0	0	0	0	0	2
INLET RESEARCH	KEC43	Anchorage	1	0	1	3	0	1	0	0	0	0	0	0	6
INSPIRATION	C6FM5	Anchorage	0	0	0	0	0	4	0	0	0	0	0	0	4
INTEGRITY	WDC6925	Baltimore	52	51	45	45	26	34	0	0	0	0	0	0	253
IRENES REMEDY	SYAQ	New York City	18	25	17	23	37	33	0	0	0	0	0	0	153
ISLAND CHAMPION	WCZ7046	Kodiak	0	1	0	2	1	0	0	0	0	0	0	0	4
ISLAND WARRIOR	WDA9217	Kodiak	0	8	16	11	13	9	0	0	0	0	0	0	57
ITB BALTIMORE	WXKM	Baltimore	0	0	16	17	9	13	0	0	0	0	0	0	55



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ITB JACKSONVILLE	WNDG	Baltimore	37	18	37	55	61	67	0	0	0	0	0	0	275
ITB NEW YORK	WVDG	Baltimore	4	27	26	19	18	28	0	0	0	0	0	0	122
J.A.W. IGLEHART	WTP4966	Chicago	0	0	0	0	26	8	0	0	0	0	0	0	34
JAMES R. BARKER	WYP8657	Chicago	66	0	37	154	150	99	0	0	0	0	0	0	506
JEAN ANNE	WDC3786	New Orleans	71	45	35	42	82	75	0	0	0	0	0	0	350
JEFFREY FOSS	WCX4608	Kodiak	0	0	0	0	29	0	0	0	0	0	0	0	29
JENS MAERSK	OYYK2	New York City	23	16	1	74	64	62	0	0	0	0	0	0	240
JEPPESEN MAERSK	OWTW2	New York City	16	31	42	33	34	22	0	0	0	0	0	0	178
JOHN G. MUNSON	WE3806	Chicago	0	0	11	58	31	90	0	0	0	0	0	0	190
JOHN J. BOLAND	WZE4539	Chicago	0	0	0	7	17	5	0	0	0	0	0	0	29
JOHN N. COBB	WMVC	Anchorage	0	0	0	0	1	13	0	0	0	0	0	0	14
JUDY LITRICO	KCKB	New Orleans	55	39	8	0	43	1	0	0	0	0	0	0	146
JUSTINE FOSS	WYL4978	Kodiak	0	0	1	0	0	9	0	0	0	0	0	0	10
JUTUL	LAVX5	Anchorage	32	18	9	0	0	0	0	0	0	0	0	0	59
KAPITAN AFANASYEV	P3XL7	Seattle	63	7	0	0	6	12	0	0	0	0	0	0	88
KAREN MAERSK	OZKN2	Seattle	56	23	0	0	0	19	0	0	0	0	0	0	98
KASIF KALKAVAN	V7IX7	Norfolk	0	0	0	0	0	25	0	0	0	0	0	0	25
KATHERINE	WUS5485	Valdez	0	0	0	0	0	1	0	0	0	0	0	0	1
KATRINE MAERSK	OZLL2	New York City	9	5	3	15	4	0	0	0	0	0	0	0	36
KAUAI	WSRH	Long Beach	30	26	35	31	18	26	0	0	0	0	0	0	166
KAYE E. BARKER	WCF3012	Chicago	0	0	8	54	14	0	0	0	0	0	0	0	76
KENAI	WSNB	Valdez	62	64	8	0	0	0	0	0	0	0	0	0	134
KENNICOTT	WCY2920	Kodiak	38	24	53	46	25	19	0	0	0	0	0	0	205
KILO MOANA	WDA7827	Honolulu	0	6	11	49	46	11	0	0	0	0	0	0	123
KIRSTEN MAERSK	OYDM2	Seattle	26	0	0	0	0	0	0	0	0	0	0	0	26
KIYI	KAO107	Chicago	0	0	0	0	0	5	0	0	0	0	0	0	5
KNORR	KCEJ	Jacksonville	10	23	22	18	0	0	0	0	0	0	0	0	73
KNUD MAERSK	OYBJ2	New York City	21	2	3	33	39	11	0	0	0	0	0	0	109
KOTZEBUE RESEARCH	KUU619	Anchorage	0	0	0	0	16	21	0	0	0	0	0	0	37
LAUREN FOSS	WDB3834	Kodiak	0	0	12	0	0	45	0	0	0	0	0	0	57
LEGEND OF THE SEAS	C6SL5	Miami	24	23	12	10	0	0	0	0	0	0	0	0	69
LESLIE LEE	WYC7933	Valdez	0	4	0	0	0	0	0	0	0	0	0	0	4
LEYLA KALKAVAN	V7JG9	Norfolk	42	38	24	0	0	0	0	0	0	0	0	0	104
LIBERTY	WRYX	Baltimore	43	51	51	23	18	65	0	0	0	0	0	0	251
LIBERTY EAGLE	WHIA	Houston	4	41	0	32	2	0	0	0	0	0	0	0	79
LIBERTY GLORY	WADP	New Orleans	10	0	21	0	0	0	0	0	0	0	0	0	31
LIBERTY GRACE	WADN	New Orleans	2	30	57	0	56	6	0	0	0	0	0	0	151
LIBERTY SEA	C6UA5	New Orleans	3	7	8	0	0	0	0	0	0	0	0	0	18
LIBERTY SPIRIT	WCPU	New Orleans	16	40	15	0	1	2	0	0	0	0	0	0	74
LIBERTY STAR	WCBP	New Orleans	48	71	30	54	31	22	0	0	0	0	0	0	256
LIBERTY SUN	WCOB	New Orleans	0	31	3	90	3	43	0	0	0	0	0	0	170
LIBERTY WAVE	C6UG8	Houston	0	0	0	0	0	27	0	0	0	0	0	0	27
LIHUE	WTST	Oakland	10	48	55	0	24	0	0	0	0	0	0	0	137
LIVORNO EXPRESS	WABU	Houston	0	22	65	54	66	57	0	0	0	0	0	0	264
LNG CAPRICORN	V7BW8	New York City	42	59	60	51	85	81	0	0	0	0	0	0	378
LNG GEMINI	V7BW9	Anchorage	6	5	11	1	13	62	0	0	0	0	0	0	98
LNG LEO	V7BX2	New York City	14	5	18	34	52	28	0	0	0	0	0	0	151
LNG LIBRA	V7BX3	Anchorage	28	24	18	10	7	13	0	0	0	0	0	0	100
LNG TAURUS	V7BX4	New York City	56	10	29	38	29	14	0	0	0	0	0	0	176
LNG VIRGO	V7BX5	New York City	16	22	17	72	86	85	0	0	0	0	0	0	298
LT GOING	IBTA	Seattle	0	0	0	7	7	7	0	0	0	0	0	0	21
LT URBAN	3FXN9	Seattle	0	2	0	0	0	1	0	0	0	0	0	0	3
LURLINE	WLVD	Oakland	32	48	50	47	43	28	0	0	0	0	0	0	248
M/V PRAIRIE SKY	3FXK4	New Orleans	0	0	0	0	0	12	0	0	0	0	0	0	12

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Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
M/V STEPHAN-J	V2JN	Miami	68	53	73	73	70	0	0	0	0	0	0	0	337
MAASDAM	PFRO	Miami	80	51	49	8	32	11	0	0	0	0	0	0	231
MACKINAC BRIDGE	JKES	New York City	52	40	37	33	33	28	0	0	0	0	0	0	223
MADISON MAERSK	OVJB2	Oakland	64	37	36	37	86	97	0	0	0	0	0	0	357
MAERSK ALASKA	KAKF	Baltimore	0	0	0	3	0	0	0	0	0	0	0	0	3
MAERSK ARIZONA	KAKG	Baltimore	9	27	9	21	15	0	0	0	0	0	0	0	81
MAERSK ARKANSAS	WDB9984	Baltimore	0	0	29	56	44	65	0	0	0	0	0	0	194
MAERSK CAROLINA	WBDS	Charleston	31	40	27	15	24	32	0	0	0	0	0	0	169
MAERSK CONSTELLATION	WRYJ	Houston	58	10	15	0	21	2	0	0	0	0	0	0	106
MAERSK DAMMAM	V2OE3	Oakland	7	8	14	1	53	20	0	0	0	0	0	0	103
MAERSK DUBLIN	V2OE1	New York City	0	0	0	0	41	23	0	0	0	0	0	0	64
MAERSK GEORGIA	WAHP	New York City	22	21	25	22	16	0	0	0	0	0	0	0	106
MAERSK MAINE	WAUY	New York City	32	37	47	46	33	50	0	0	0	0	0	0	245
MAERSK MARYLAND	WAUU	New York City	11	0	0	32	28	48	0	0	0	0	0	0	119
MAERSK MISSOURI	WAHV	Norfolk	22	4	25	12	2	45	0	0	0	0	0	0	110
MAERSK NEUSTADT	C4AH2	Seattle	0	1	0	0	0	0	0	0	0	0	0	0	1
MAERSK NEVADA	WMLG	Norfolk	20	19	25	25	36	11	0	0	0	0	0	0	136
MAERSK NEWARK	A8CF2	New York City	18	16	18	11	12	0	0	0	0	0	0	0	75
MAERSK SUN	S6ES	Seattle	13	0	0	23	48	36	0	0	0	0	0	0	120
MAERSK VALENCIA	DAPG	New York City	10	9	13	7	8	9	0	0	0	0	0	0	56
MAERSK VERMONT	WAUW	New York City	27	26	58	34	34	6	0	0	0	0	0	0	185
MAERSK VIRGINIA	WAHK	Norfolk	4	25	14	8	6	0	0	0	0	0	0	0	57
MAERSK WAVE	S6TV	Baltimore	7	4	0	1	3	4	0	0	0	0	0	0	19
MAERSK WIND	S6TY	Baltimore	28	4	2	35	51	53	0	0	0	0	0	0	173
MAGLEBY MAERSK	OUH2	New York City	21	4	29	41	38	27	0	0	0	0	0	0	160
MAHMAHI	WHRN	Oakland	55	22	49	38	24	48	0	0	0	0	0	0	236
MAIA H.	WYX2079	Kodiak	0	0	1	16	0	28	0	0	0	0	0	0	45
MAJESTIC MAERSK	OUJH2	New York City	27	40	34	24	30	41	0	0	0	0	0	0	196
MANOA	KDBG	Oakland	47	38	59	34	35	39	0	0	0	0	0	0	252
MANUKAI	WRGD	New York City	37	31	4	6	5	0	0	0	0	0	0	0	83
MANULANI	WDC4696	New York City	50	43	47	57	63	63	0	0	0	0	0	0	323
MARCY J	WCF4791	Valdez	0	0	8	0	0	0	0	0	0	0	0	0	8
MAREN MAERSK	OWZU2	Long Beach	38	29	30	34	28	42	0	0	0	0	0	0	201
MARGRETHE MAERSK	OYSN2	Long Beach	41	14	23	18	11	0	0	0	0	0	0	0	107
MARIE MAERSK	OULL2	New York City	38	47	55	64	42	25	0	0	0	0	0	0	271
MARIELLE BOLTEN	ELZH9	New York City	6	0	0	0	0	0	0	0	0	0	0	0	6
MARINER OF THE SEAS	C6FV9	Jacksonville	0	0	0	0	0	9	0	0	0	0	0	0	9
MARK HANNAH	WYZ5243	Chicago	0	0	0	8	5	1	0	0	0	0	0	0	14
MARLIN	6ZXG	New Orleans	77	65	59	27	32	43	0	0	0	0	0	0	303
MARY ANN HUDSON	KSDF	Houston	42	28	45	51	41	6	0	0	0	0	0	0	213
MATANUSKA	WN4201	Kodiak	1	8	4	19	25	24	0	0	0	0	0	0	81
MATHILDE MAERSK	OUUU2	Long Beach	21	8	8	17	25	3	0	0	0	0	0	0	82
MATSONIA	KHRC	Oakland	50	45	45	54	61	51	0	0	0	0	0	0	306
MAUI	WSLH	Long Beach	46	0	0	21	20	0	0	0	0	0	0	0	87
MAUMEE	WDA4649	Chicago	0	0	0	0	5	31	0	0	0	0	0	0	36
MAUNAWILI	WDB7104	New York City	44	10	22	43	43	17	0	0	0	0	0	0	179
MAYVIEW MAERSK	OWEB2	Oakland	38	13	0	25	42	26	0	0	0	0	0	0	144
MCARTHUR II	WTEJ	Seattle	0	0	55	98	120	102	0	0	0	0	0	0	375
MCKEE SONS	WCZ9703	Chicago	23	0	27	40	33	57	0	0	0	0	0	0	180
MC-KINNEY MAERSK	OUZW2	New York City	4	28	10	39	7	10	0	0	0	0	0	0	98
MELVILLE	WECB	Long Beach	0	0	29	82	40	10	0	0	0	0	0	0	161
MERCURY	C6SQ6	Miami	7	3	0	0	0	0	0	0	0	0	0	0	10
MERKUR	PJTA	New York City	681	374	0	0	0	0	0	0	0	0	0	0	1055
MESABI MINER	WYQ4356	Chicago	40	0	15	39	20	49	0	0	0	0	0	0	163



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Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
METTE MAERSK	OXKT2	Long Beach	40	23	23	47	29	47	0	0	0	0	0	0	209
MICHAEL O'LEARY	WCP9556	Kodiak	0	0	0	0	0	1	0	0	0	0	0	0	1
MICHIGAN	WRB4141	Chicago	0	0	0	5	2	1	0	0	0	0	0	0	8
MIDDLETOWN	WR3225	Chicago	5	0	0	14	13	0	0	0	0	0	0	0	32
MIDNIGHT SUN	WAHG	Seattle	115	14	74	92	115	40	0	0	0	0	0	0	450
MILLER FREEMAN	WTDM	Seattle	0	111	164	128	164	195	0	0	0	0	0	0	762
MISS MARY	WDB3095	Valdez	0	0	0	0	3	0	0	0	0	0	0	0	3
MISS ROXANNE	WCX4992	Valdez	0	0	0	0	12	7	0	0	0	0	0	0	19
MOBILE	KXDB	New York City	24	3	0	0	0	14	0	0	0	0	0	0	41
MOKIHANA	WNRD	Oakland	37	30	27	59	50	34	0	0	0	0	0	0	237
MOKU PAHU	WBWK	Oakland	27	5	12	3	11	25	0	0	0	0	0	0	83
MOL COMMITMENT	9VID2	Charleston	13	53	32	23	24	0	0	0	0	0	0	0	145
MOL INNOVATION	9VVP	Oakland	47	58	69	61	47	63	0	0	0	0	0	0	345
MOL VELOCITY	9VVK	Seattle	41	0	24	26	31	50	0	0	0	0	0	0	172
MONTAUK	WDCJ	New Orleans	45	52	60	81	77	24	0	0	0	0	0	0	339
MSC DONATA	A8EU2	Anchorage	9	0	0	34	44	55	0	0	0	0	0	0	142
MSC ELENA	HPAU	New York City	0	3	15	6	12	25	0	0	0	0	0	0	61
MSC EMMA	HPXB	New York City	0	0	0	0	0	3	0	0	0	0	0	0	3
MSC MATILDE	HODP	New York City	19	20	43	39	59	4	0	0	0	0	0	0	184
MSC ULSAN	C6SV2	New York City	14	28	29	26	42	13	0	0	0	0	0	0	152
NANCY FOSTER	WTER	Norfolk	0	0	47	37	30	13	0	0	0	0	0	0	127
NANUQ	WCY8498	Valdez	2	2	0	0	0	0	0	0	0	0	0	0	4
NARRAGANSETT	NL9H	Kodiak	36	16	69	54	60	80	0	0	0	0	0	0	315
NATOMA	WBB5799	Kodiak	4	7	0	0	0	1	0	0	0	0	0	0	12
NAVAJO	WCT5737	Kodiak	3	8	0	0	0	1	0	0	0	0	0	0	12
NAVIGATOR OF THE SEAS	C6FU4	Miami	21	24	22	18	1	0	0	0	0	0	0	0	86
NEW HORIZON	WKWB	Long Beach	0	0	0	12	0	0	0	0	0	0	0	0	12
NOAA SHIP KA'IMIMOANA	WTEU	Honolulu	76	35	0	88	41	98	0	0	0	0	0	0	338
NOORDAM	PHET	Anchorage	0	27	21	3	2	5	0	0	0	0	0	0	58
NORASIA ATLAS	A8GX4	New York City	2	4	3	9	35	9	0	0	0	0	0	0	62
NORASIA SILS	HBDF	New York City	0	2	0	0	0	0	0	0	0	0	0	0	2
NORTH STAR	KIYI	Seattle	55	12	47	60	49	15	0	0	0	0	0	0	238
NORTHERN VICTOR	WCZ6534	Kodiak	8	0	3	9	0	45	0	0	0	0	0	0	65
NORTHWEST EXPLORER	WCZ9007	Kodiak	0	0	0	0	0	7	0	0	0	0	0	0	7
NORWEGIAN STAR	C6FR3	Anchorage	0	0	0	0	25	25	0	0	0	0	0	0	50
NORWEGIAN SUN	C6RN3	Anchorage	0	0	0	0	0	17	0	0	0	0	0	0	17
NORWEGIAN WIND	C6LG6	Miami	0	0	0	0	10	18	0	0	0	0	0	0	28
NOVA TERRA	C6IZ7	Miami	4	25	43	23	35	56	0	0	0	0	0	0	186
NUNANIQ	WRC2049	Kodiak	0	0	0	0	0	2	0	0	0	0	0	0	2
OCEAN MARINER	WCF3990	Kodiak	0	0	0	0	2	29	0	0	0	0	0	0	31
OCEAN NAVIGATOR	WSC2552	Kodiak	0	0	2	0	0	0	0	0	0	0	0	0	2
OCEAN PREFACE	VRUL7	New Orleans	0	0	0	0	0	1	0	0	0	0	0	0	1
OCEAN RANGER	WAM7635	Kodiak	0	0	1	0	8	42	0	0	0	0	0	0	51
OCEAN RELIANCE	WADY	Kodiak	19	3	0	11	9	8	0	0	0	0	0	0	50
OCEAN SOVEREIGN	HP6038	Houston	0	0	0	0	0	221	0	0	0	0	0	0	221
OCEAN TITAN	WDC7175	Jacksonville	53	35	81	19	7	6	0	0	0	0	0	0	201
OCEAN TITAN	WDB9647	Kodiak	0	5	1	0	8	0	0	0	0	0	0	0	14
OCEANA	ZCDN9	Anchorage	0	0	0	4	0	8	0	0	0	0	0	0	12
OGLEBAY NORTON	WAQ3521	Chicago	24	0	4	27	7	10	0	0	0	0	0	0	72
OLEANDER	PJJU	New York City	8	10	4	3	13	10	0	0	0	0	0	0	48
OLIVIA MAERSK	OXKO2	Miami	35	15	21	42	19	0	0	0	0	0	0	0	132
OLUF MAERSK	OXFU2	New York City	0	0	0	0	4	0	0	0	0	0	0	0	4
OOCL AMERICA	VRWE8	Seattle	19	21	16	24	29	21	0	0	0	0	0	0	130
OOCL CALIFORNIA	VRWC8	Seattle	31	15	4	0	23	6	0	0	0	0	0	0	79

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Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
OOCL FAIR	VRWB8	Long Beach	6	15	19	27	38	40	0	0	0	0	0	0	145
OOCL FIDELITY	VRWG5	Long Beach	9	3	10	14	8	28	0	0	0	0	0	0	72
OOCL FRIENDSHIP	VRWD3	Long Beach	8	24	23	15	16	15	0	0	0	0	0	0	101
OOCL NETHERLANDS	VRVN6	Long Beach	21	14	6	24	16	17	0	0	0	0	0	0	98
OOCL TIANJIN	VRAR7	Anchorage	19	14	19	4	20	29	0	0	0	0	0	0	105
OOSTERDAM	PBKH	Anchorage	1	3	0	1	23	26	0	0	0	0	0	0	54
ORANGE STAR	ELFS7	New York City	77	55	60	49	61	63	0	0	0	0	0	0	365
ORANGE WAVE	ELPX7	New York City	83	52	64	71	86	56	0	0	0	0	0	0	412
OREGON II	WTDO	New Orleans	0	59	71	66	44	0	0	0	0	0	0	0	240
ORION VOYAGER	C6MC5	Baltimore	0	0	18	13	8	1	0	0	0	0	0	0	40
OSCAR DYSON	WTEP	Anchorage	0	0	0	31	48	14	0	0	0	0	0	0	93
OSCAR ELTON SETTE	WTEE	Jacksonville	38	71	73	29	38	44	0	0	0	0	0	0	293
OURO DO BRASIL	ELPP9	Baltimore	22	7	34	5	23	50	0	0	0	0	0	0	141
OVERSEAS AMBERMAR	WDC7019	Norfolk	0	0	0	8	0	0	0	0	0	0	0	0	8
OVERSEAS HARRIETTE	WRFJ	Houston	8	0	9	5	35	59	0	0	0	0	0	0	116
OVERSEAS JOYCE	WUQL	Jacksonville	34	13	20	21	6	7	0	0	0	0	0	0	101
OVERSEAS MARILYN	WFQB	Houston	20	12	0	20	9	31	0	0	0	0	0	0	92
OVERSEAS NEW ORLEANS	WFKW	Houston	0	20	36	19	25	0	0	0	0	0	0	0	100
OVERSEAS PHILADELPHIA	WGDB	Miami	22	21	11	5	9	7	0	0	0	0	0	0	75
PACIFIC CHALLENGER	WDC7518	Kodiak	2	233	139	277	226	188	0	0	0	0	0	0	1065
PACIFIC PRIDE	WDC7515	Kodiak	0	0	0	0	0	44	0	0	0	0	0	0	44
PACIFIC RAVEN	WDC7505	Kodiak	0	0	0	0	0	46	0	0	0	0	0	0	46
PACIFIC RELIANCE	WDC9368	Kodiak	0	0	0	0	1	0	0	0	0	0	0	0	1
PACIFIC STAR	WCW7740	Valdez	1	0	3	1	0	0	0	0	0	0	0	0	5
PARADISE	3FOB5	Miami	0	34	16	0	0	0	0	0	0	0	0	0	50
PARAGON	WDC7523	Kodiak	4	50	55	11	36	31	0	0	0	0	0	0	187
PATHFINDER	WBN8467	Valdez	35	16	8	6	32	7	0	0	0	0	0	0	104
PATRIOT	WQVY	Baltimore	27	31	16	21	31	0	0	0	0	0	0	0	126
PAUL R. TREGURTHA	WYR4481	Chicago	81	0	14	72	75	112	0	0	0	0	0	0	354
PHILADELPHIA	KSYP	Miami	25	4	5	12	19	2	0	0	0	0	0	0	67
PHILADELPHIA EXPRESS	WDC6736	Houston	123	113	133	141	73	104	0	0	0	0	0	0	687
PHILIP R. CLARKE	WE3592	Chicago	0	0	15	80	112	160	0	0	0	0	0	0	367
PHOENIX VOYAGER	C6QE3	Oakland	28	31	47	0	17	25	0	0	0	0	0	0	148
PHYLLIS DUNLAP	WDA6552	Kodiak	136	31	0	0	0	0	0	0	0	0	0	0	167
PICTON CASTLE	ZKWP	Anchorage	33	29	0	36	22	2	0	0	0	0	0	0	122
POINT BARROW	WBM5088	Kodiak	0	0	0	0	0	4	0	0	0	0	0	0	4
POLAR ADVENTURE	WAZV	New Orleans	15	25	21	26	29	20	0	0	0	0	0	0	136
POLAR ALASKA	KSBK	Valdez	17	34	24	30	23	61	0	0	0	0	0	0	189
POLAR CALIFORNIA	WMCV	Long Beach	9	20	32	23	17	6	0	0	0	0	0	0	107
POLAR DISCOVERY	WACW	New Orleans	13	13	0	0	21	26	0	0	0	0	0	0	73
POLAR EAGLE	ELPT3	Anchorage	181	139	147	133	137	120	0	0	0	0	0	0	857
POLAR ENDEAVOUR	WCAJ	New Orleans	30	30	34	22	21	44	0	0	0	0	0	0	181
POLAR RANGER	WDC8652	Kodiak	0	0	0	16	54	15	0	0	0	0	0	0	85
POLAR RESOLUTION	WDJK	New Orleans	96	74	74	96	83	107	0	0	0	0	0	0	530
PREMIUM DO BRASIL	A8BL4	Baltimore	4	3	9	2	0	0	0	0	0	0	0	0	18
PRESIDENT ADAMS	WRYW	Long Beach	44	49	67	1	0	0	0	0	0	0	0	0	161
PRESIDENT GRANT	WCY2098	Long Beach	38	3	0	0	0	0	0	0	0	0	0	0	41
PRESIDENT JACKSON	WRYC	Long Beach	7	40	49	55	27	43	0	0	0	0	0	0	221
PRESIDENT POLK	WRYD	Long Beach	54	2	10	53	57	65	0	0	0	0	0	0	241
PRESIDENT TRUMAN	WNDP	Long Beach	30	45	33	13	26	31	0	0	0	0	0	0	178
PRESIDENT WILSON	WCY3438	Long Beach	33	43	0	0	0	0	0	0	0	0	0	0	76
PRESQUE ISLE	WZE4928	Chicago	6	0	4	32	8	24	0	0	0	0	0	0	74
PRIDE OF BALTIMORE II	WUW2120	Baltimore	0	0	48	79	23	30	0	0	0	0	0	0	180
PRINCE WILLIAM SOUND	WSDX	Valdez	0	0	0	15	39	7	0	0	0	0	0	0	61



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Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
PRINSENDAM	PBGH	Anchorage	18	3	0	9	50	31	0	0	0	0	0	0	111
PT. OLIKTOK	WBM5091	Kodiak	0	0	0	0	32	46	0	0	0	0	0	0	78
PT. THOMPSON	WBN5092	Kodiak	0	0	0	0	0	14	0	0	0	0	0	0	14
PUGET SOUND	WXBZ	Valdez	7	2	0	0	0	0	0	0	0	0	0	0	9
PURITAN	ZCDH9	Miami	37	37	38	12	3	41	0	0	0	0	0	0	168
PUSAN SENATOR	DQVG	Seattle	38	15	16	19	12	4	0	0	0	0	0	0	104
R.J. PFEIFFER	WRJP	Long Beach	6	4	1	0	0	0	0	0	0	0	0	0	11
R/V ENDEAVOR	WCE5063	New York City	0	0	19	13	6	1	0	0	0	0	0	0	39
RAINIER	WTEF	Seattle	0	0	0	49	74	72	0	0	0	0	0	0	195
REDEEMER	WDA8432	Kodiak	0	0	0	0	2	8	0	0	0	0	0	0	10
REGAL PRINCESS	ZCBU4	Anchorage	0	0	0	0	6	3	0	0	0	0	0	0	9
REGINA MAERSK	OZIN2	New York City	47	52	33	31	27	23	0	0	0	0	0	0	213
RESOLVE	WCZ5535	Baltimore	12	26	33	1	37	0	0	0	0	0	0	0	109
RHAPSODY OF THE SEAS	C6UA2	Houston	0	0	18	16	41	18	0	0	0	0	0	0	93
RHINE FOREST	V7EI9	New Orleans	61	41	69	61	56	49	0	0	0	0	0	0	337
RICHARD G MATTHIESEN	NBBP	Jacksonville	0	7	0	0	0	0	0	0	0	0	0	0	7
RICKMERS HAMBERG	V7DS3	New Orleans	17	3	21	2	3	0	0	0	0	0	0	0	46
ROBERT C. SEAMENS	WDA4486	Kodiak	5	21	50	82	36	5	0	0	0	0	0	0	199
ROGER BLOUGH	WZP8164	Chicago	0	0	0	7	42	11	0	0	0	0	0	0	60
ROGER REVELLE	KAOU	Long Beach	68	90	70	46	49	24	0	0	0	0	0	0	347
RONALD H. BROWN	WTEC	New Orleans	0	24	86	56	98	74	0	0	0	0	0	0	338
ROTTERDAM	PDGS	Anchorage	24	89	29	49	47	16	0	0	0	0	0	0	254
ROUGHNECK	WTW9262	Kodiak	0	0	0	0	3	0	0	0	0	0	0	0	3
ROWAN GORILLA VI	WCZ6545	Anchorage	0	0	0	0	0	217	0	0	0	0	0	0	217
RUBIN PEARL	YJQA8	Seattle	46	25	55	40	40	57	0	0	0	0	0	0	263
RYNDAM	PHFV	Miami	13	25	1	9	5	4	0	0	0	0	0	0	57
S/R BAYTOWN	KFPM	Valdez	22	13	0	12	22	26	0	0	0	0	0	0	95
S/R WILMINGTON	WBVZ	Houston	11	8	20	28	10	9	0	0	0	0	0	0	86
SAFMARINE ILLOVO	A8HJ8	New York City	22	29	19	49	24	101	0	0	0	0	0	0	244
SAFMARINE ZAMBEZI	A8CE9	New York City	0	0	0	0	18	17	0	0	0	0	0	0	35
SAKURA	V2AK3	New York City	45	31	41	16	25	28	0	0	0	0	0	0	186
SALISHAN	WUT4384	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
SALLY MAERSK	OZHS2	Seattle	0	2	0	8	3	0	0	0	0	0	0	0	13
SAMSON MARINER	WCN3586	Kodiak	4	2	23	0	2	8	0	0	0	0	0	0	39
SANDRA FOSS	WYL4908	Kodiak	0	0	9	12	20	7	0	0	0	0	0	0	48
SANTA BARBARA	MGYF6	Seattle	27	18	31	40	45	42	0	0	0	0	0	0	203
SARGASSO	H9YR	Houston	6	8	9	10	8	0	0	0	0	0	0	0	41
SAUDI ABHA	HZRZ	Baltimore	8	44	43	27	30	24	0	0	0	0	0	0	176
SAUDI DIRIYAH	HZZB	Houston	0	19	49	51	1	1	0	0	0	0	0	0	121
SAUDI HOFUF	HZZC	Houston	6	21	31	3	10	15	0	0	0	0	0	0	86
SAUDI TABUK	HZZD	Houston	55	64	44	64	37	5	0	0	0	0	0	0	269
SCHACKENBORG	ZCIH7	Houston	79	25	33	38	36	29	0	0	0	0	0	0	240
SEA PRINCE	WYT8569	Kodiak	14	40	6	0	64	27	0	0	0	0	0	0	151
SEA RELIANCE	WEOB	Kodiak	50	19	10	0	17	4	0	0	0	0	0	0	100
SEA STORM	WCV9132	Valdez	0	0	0	0	0	1	0	0	0	0	0	0	1
SEA VIKING	WCE8951	Kodiak	0	0	0	0	22	9	0	0	0	0	0	0	31
SEABULK AMERICA	WWYY	Anchorage	83	40	54	87	87	67	0	0	0	0	0	0	418
SEABULK ARCTIC	WCY7054	Anchorage	28	13	28	33	16	12	0	0	0	0	0	0	130
SEABULK MONTANA	WCW9126	Anchorage	0	0	1	8	0	0	0	0	0	0	0	0	9
SEABULK NEVADA	WCY2306	Anchorage	107	139	192	95	187	202	0	0	0	0	0	0	922
SEABULK PRIDE	WCY7052	Anchorage	34	18	4	31	42	44	0	0	0	0	0	0	173
SEABULK TRADER	KNJK	Miami	6	12	3	17	9	4	0	0	0	0	0	0	51
SEA-LAND ACHIEVER	WPKD	Houston	66	34	34	65	55	52	0	0	0	0	0	0	306
SEA-LAND ATLANTIC	KRLZ	Houston	55	41	52	52	32	44	0	0	0	0	0	0	276

VOS Cooperative Ship Report



Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SEA-LAND CHAMPION	MCDZ2	Oakland	23	29	45	53	43	46	0	0	0	0	0	0	239
SEA-LAND CHARGER	WDB9948	Long Beach	0	0	0	0	29	35	0	0	0	0	0	0	64
SEA-LAND COMET	WDB9950	Norfolk	59	45	42	44	30	30	0	0	0	0	0	0	250
SEA-LAND COMMITMENT	KRPB	Houston	62	59	141	121	189	194	0	0	0	0	0	0	766
SEA-LAND DEFENDER	V7HX4	Oakland	0	30	38	34	31	0	0	0	0	0	0	0	133
SEA-LAND DEVELOPER	V7HZ7	Seattle	0	0	59	31	0	19	0	0	0	0	0	0	109
SEA-LAND EAGLE	MCDZ9	Long Beach	64	25	20	0	48	45	0	0	0	0	0	0	202
SEA-LAND EXPRESS	V7HH7	Long Beach	60	39	38	22	52	32	0	0	0	0	0	0	243
SEA-LAND FLORIDA	KRHX	Houston	73	46	65	76	70	79	0	0	0	0	0	0	409
SEA-LAND INNOVATOR	V7IA8	Seattle	11	24	6	26	0	23	0	0	0	0	0	0	90
SEA-LAND INTEGRITY	V7IP8	Houston	10	45	17	22	2	3	0	0	0	0	0	0	99
SEA-LAND INTREPID	WDB9949	Charleston	44	0	27	45	44	30	0	0	0	0	0	0	190
SEA-LAND LIBERATOR	V7IQ2	Charleston	64	51	44	39	41	11	0	0	0	0	0	0	250
SEA-LAND MERCURY	MCDW9	Oakland	53	43	65	47	6	0	0	0	0	0	0	0	214
SEA-LAND METEOR	WDB9951	Long Beach	57	10	41	18	26	25	0	0	0	0	0	0	177
SEA-LAND MOTIVATOR	WAAH	Houston	55	46	97	74	87	93	0	0	0	0	0	0	452
SEA-LAND PERFORMANCE	KRPD	Houston	35	55	61	49	55	54	0	0	0	0	0	0	309
SEA-LAND PRIDE	WDB9444	Houston	102	67	66	68	87	57	0	0	0	0	0	0	447
SEA-LAND QUALITY	KRNJ	Houston	90	51	40	45	30	57	0	0	0	0	0	0	313
SEA-LAND RACER	MCDW2	Charleston	18	5	27	19	10	0	0	0	0	0	0	0	79
SELMA KALKAVAN	V7GX5	Norfolk	55	66	31	56	65	55	0	0	0	0	0	0	328
SENECA	WBN8469	Kodiak	0	0	5	58	39	25	0	0	0	0	0	0	127
SHEILA MCDEVITT	WDA4069	New Orleans	0	0	0	0	9	22	0	0	0	0	0	0	31
SIDNEY FOSS	WYL5445	Kodiak	19	2	3	0	17	12	0	0	0	0	0	0	53
SIKU	WCQ6174	Kodiak	0	0	0	0	49	47	0	0	0	0	0	0	96
SILKEBORG	EIJV	Houston	34	19	19	0	0	0	0	0	0	0	0	0	72
SILKEBORG	ZDHH7	Houston	0	0	0	74	83	80	0	0	0	0	0	0	237
SINE MAERSK	OZOK2	Seattle	75	0	11	18	0	50	0	0	0	0	0	0	154
SINUK	WCQ8110	Kodiak	0	0	0	59	180	217	0	0	0	0	0	0	456
SIOUX	WBN7617	Kodiak	0	0	0	0	2	21	0	0	0	0	0	0	23
SKANDERBORG	ZCIG4	Houston	0	0	14	0	0	0	0	0	0	0	0	0	14
SKODSBORG	ZCIJ7	Baltimore	79	27	25	21	5	0	0	0	0	0	0	0	157
SNOHOMISH	WSQ8098	Kodiak	0	0	0	0	2	15	0	0	0	0	0	0	17
SOFIE MAERSK	OZUN2	Seattle	20	0	67	0	33	19	0	0	0	0	0	0	139
SOL DO BRASIL	ELQQ4	Baltimore	2	0	1	8	1	0	0	0	0	0	0	0	12
SOROE MAERSK	OYKJ2	Seattle	32	26	0	0	28	0	0	0	0	0	0	0	86
SOUND RELIANCE	WXAE	Kodiak	12	28	12	26	9	46	0	0	0	0	0	0	133
SPIRIT OF MASSACHUSETTS	WCZ9474	New York City	0	0	0	13	0	0	0	0	0	0	0	0	13
SPIRIT OF OCEANUS	C6PJ8	Anchorage	0	0	0	0	0	2	0	0	0	0	0	0	2
SS BADGER	WBD4889	Chicago	0	0	0	0	0	15	0	0	0	0	0	0	15
ST NICHOLAS	WDB8066	Valdez	0	0	0	0	13	0	0	0	0	0	0	0	13
ST PAUL RESEARCH	KEY796	Anchorage	4	1	0	0	0	0	0	0	0	0	0	0	5
ST. CLAIR	WZA4027	Chicago	0	0	0	45	5	0	0	0	0	0	0	0	50
ST. MARYS CHALLENGER	WDB9135	Chicago	0	0	0	7	49	39	0	0	0	0	0	0	95
STACEY FOSS	WYL4909	Kodiak	0	0	0	0	0	8	0	0	0	0	0	0	8
STAR ALABAMA	LAVU4	Baltimore	16	0	17	14	15	14	0	0	0	0	0	0	76
STAR AMERICA	LAVV4	Jacksonville	23	14	20	44	31	0	0	0	0	0	0	0	132
STAR EAGLE	LAWO2	Baltimore	26	24	26	59	1	0	0	0	0	0	0	0	136
STAR EVVIVA	LAHE2	Jacksonville	0	17	24	19	8	15	0	0	0	0	0	0	83
STAR FLORIDA	LAVW4	Houston	17	2	12	6	0	43	0	0	0	0	0	0	80
STAR GEIRANGER	LAKQ5	Seattle	47	44	44	35	41	35	0	0	0	0	0	0	246
STAR GRAN	LADR4	Long Beach	0	0	0	0	27	10	0	0	0	0	0	0	37
STAR GRINDANGER	LAKR5	Seattle	0	0	39	35	1	0	0	0	0	0	0	0	75



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Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
STAR HANSA	LAXP4	Jacksonville	8	8	0	19	25	0	0	0	0	0	0	0	60
STAR HARMONIA	LAGB5	Baltimore	52	25	20	18	8	0	0	0	0	0	0	0	123
STAR HERDLA	LAVD4	Baltimore	23	0	0	47	67	26	0	0	0	0	0	0	163
STAR HIDRA	LAVN4	Baltimore	0	0	0	0	23	10	0	0	0	0	0	0	33
STAR ISMENE	LANT5	Baltimore	28	47	29	18	8	26	0	0	0	0	0	0	156
STAR ISTIND	LAMP5	Houston	16	32	29	22	24	24	0	0	0	0	0	0	147
STAR JAPAN	LAZV5	Baltimore	9	38	19	52	9	26	0	0	0	0	0	0	153
STAR JUVENTAS	LAZU5	Baltimore	0	0	5	7	16	0	0	0	0	0	0	0	28
STATENDAM	PHSG	Miami	68	61	38	2	16	74	0	0	0	0	0	0	259
STELLAR SEA	KGCJ	Kodiak	1	0	0	0	6	0	0	0	0	0	0	0	7
STEWART J. CORT	WDC6055	Chicago	6	0	1	93	106	75	0	0	0	0	0	0	281
STIMSON	KF002	Kodiak	100	51	72	24	2	51	0	0	0	0	0	0	300
STRONG PATRIOT	WCZ8589	Norfolk	82	1	0	45	82	40	0	0	0	0	0	0	250
SUMIDA	3FMX7	New York City	119	140	41	2	4	6	0	0	0	0	0	0	312
SUMMIT	C6FU9	Miami	0	0	13	6	0	0	0	0	0	0	0	0	19
SUNBELT SPIRIT	V7DK4	New York City	15	12	6	4	0	0	0	0	0	0	0	0	37
SUSAN MAERSK	OYIK2	Seattle	21	27	0	52	14	0	0	0	0	0	0	0	114
SVEND MAERSK	OYJS2	Seattle	0	26	9	18	41	0	0	0	0	0	0	0	94
SWIFT ARROW	C6NI7	Anchorage	17	28	38	23	43	21	0	0	0	0	0	0	170
SYNERGY	WWF65	Kodiak	0	0	0	0	58	20	0	0	0	0	0	0	78
T/V ENTERPRISE	KVMU	New York City	17	29	0	0	0	0	0	0	0	0	0	0	46
T/V STATE OF MAINE	WCAH	Charleston	0	0	0	0	55	51	0	0	0	0	0	0	106
TAIO FRONTIER	3EZF5	Anchorage	10	2	8	6	0	0	0	0	0	0	0	0	26
TALISMAN	LAOW5	Jacksonville	0	0	0	13	0	26	0	0	0	0	0	0	39
TAMESIS	LAOL5	Norfolk	0	0	0	0	6	0	0	0	0	0	0	0	6
TAMPA	LMWO3	Baltimore	23	20	31	35	36	23	0	0	0	0	0	0	168
TAN'ERLIQ	WCY8497	Valdez	3	7	3	0	0	0	0	0	0	0	0	0	13
THOMAS G. THOMPSON	KTDQ	Seattle	8	54	67	51	27	53	0	0	0	0	0	0	260
THOMAS JEFFERSON	WTEA	Norfolk	0	0	0	77	50	0	0	0	0	0	0	0	127
TIGLAX	WZ3423	Anchorage	0	0	0	0	5	3	0	0	0	0	0	0	8
TITAN	WAW9232	Kodiak	2	10	20	7	10	0	0	0	0	0	0	0	49
TORDENSKJOLD	WB3888	Kodiak	0	0	0	0	0	2	0	0	0	0	0	0	2
TREIN MAERSK	MSQQ8	Baltimore	16	20	16	32	22	33	0	0	0	0	0	0	139
TUSTUMENA	WNGW	Kodiak	0	0	0	47	28	18	0	0	0	0	0	0	93
TYCO DECISIVE	V7DI7	Baltimore	0	0	0	0	0	55	0	0	0	0	0	0	55
TYCO DURABLE	V7DI8	Baltimore	0	0	0	0	4	0	0	0	0	0	0	0	4
TYCOM RELIANCE	V7CZ2	Baltimore	0	0	0	0	33	0	0	0	0	0	0	0	33
UBC SAIKI	P3GY9	Seattle	49	38	42	69	53	40	0	0	0	0	0	0	291
UBC SVEA	P3JA8	Seattle	27	25	36	17	34	22	0	0	0	0	0	0	161
UNITED SPIRIT	ELYB2	Seattle	80	68	75	70	66	80	0	0	0	0	0	0	439
UNIVERSAL SPIRIT	ELNT7	New York City	36	5	0	0	0	0	0	0	0	0	0	0	41
USCGC ALEX HALEY	NZPO	Kodiak	7	10	0	0	0	0	0	0	0	0	0	0	17
USCGC HEALY	NEPP	Seattle	0	0	0	7	184	61	0	0	0	0	0	0	252
USCGC MAPLE (WLB 207)	NWBE	Kodiak	9	3	5	0	0	0	0	0	0	0	0	0	17
USCGC POLAR STAR	NBTM	Seattle	75	176	150	0	0	0	0	0	0	0	0	0	401
VALDEZ RESEARCH	WXJ63	Valdez	221	204	191	220	230	222	0	0	0	0	0	0	1288
VALENCIA BRIDGE	HOUU	Anchorage	50	31	55	55	53	36	0	0	0	0	0	0	280
VANCOUVER BRIDGE	H8FE	Seattle	10	6	7	3	0	0	0	0	0	0	0	0	26
VEENDAM	PHEO	Miami	0	41	39	21	22	42	0	0	0	0	0	0	165
VIKING STAR	WAS4138	Kodiak	6	1	5	0	5	0	0	0	0	0	0	0	17
VINCENT THOMAS BRIDGE	H3WJ	Seattle	53	22	51	43	20	26	0	0	0	0	0	0	215
VIRGINIA BRIDGE	HOKP	Anchorage	50	47	36	30	45	39	0	0	0	0	0	0	247
VIRGINIAN	KSPH	Houston	0	2	7	0	6	0	0	0	0	0	0	0	15
VLADIVOSTOK	P3BJ8	Seattle	2	0	0	0	0	0	0	0	0	0	0	0	2

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Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
VOLENDAM	PCHM	Anchorage	0	0	40	12	37	69	0	0	0	0	0	0	158
WARRIOR	WBN4383	Kodiak	0	0	0	0	1	0	0	0	0	0	0	0	1
WASHINGTON VOYAGER	KFDB	Oakland	0	0	0	26	4	0	0	0	0	0	0	0	30
WECOMA	WSD7079	Seattle	0	0	0	18	49	34	0	0	0	0	0	0	101
WESTERDAM	PINX	Miami	18	44	44	32	3	27	0	0	0	0	0	0	168
WESTERN RANGER	WBN3008	Kodiak	0	0	0	5	40	29	0	0	0	0	0	0	74
WESTRAC II	WCU4545	Kodiak	0	0	0	0	8	0	0	0	0	0	0	0	8
WESTWARD	WDB4655	New York City	0	0	0	33	8	0	0	0	0	0	0	0	41
WESTWARD VENTURE	KHJB	Seattle	1	0	25	29	37	0	0	0	0	0	0	0	92
WESTWOOD ANETTE	C6QO9	Seattle	15	14	8	17	1	16	0	0	0	0	0	0	71
WESTWOOD COLUMBIA	C6SI4	Seattle	47	44	38	50	36	7	0	0	0	0	0	0	222
WESTWOOD MARIANNE	C6QD3	Seattle	57	11	24	6	10	14	0	0	0	0	0	0	122
WESTWOOD OLYMPIA	C6UB2	Seattle	42	37	42	0	0	0	0	0	0	0	0	0	121
WESTWOOD RAINIER	C6SI3	Seattle	26	21	60	59	70	31	0	0	0	0	0	0	267
WESTWOOD VICTORIA	C6SI6	Seattle	31	30	15	0	0	26	0	0	0	0	0	0	102
WILFRED SYKES	WDA2769	Chicago	0	0	1	23	32	47	0	0	0	0	0	0	103
WILSON	WNPD	New Orleans	22	12	37	11	38	0	0	0	0	0	0	0	120
WOLDSTAD	KF001	Kodiak	10	4	0	33	37	42	0	0	0	0	0	0	126
WOLVERINE	WZC4518	Chicago	22	0	2	34	24	25	0	0	0	0	0	0	107
WORLD SPIRIT	ELWG7	Seattle	3	85	83	79	80	55	0	0	0	0	0	0	385
YM GENOVA II	A8JC8	New York City	62	50	52	39	44	44	0	0	0	0	0	0	291
ZAANDAM	PDAN	Miami	21	43	52	103	275	145	0	0	0	0	0	0	639
ZENITH	C6FU3	Miami	9	4	0	0	2	5	0	0	0	0	0	0	20
ZIM AMERICA	9HAB8	New York City	46	35	0	24	48	0	0	0	0	0	0	0	153
ZIM BEIJING	A8FU7	New York City	8	5	6	3	9	0	0	0	0	0	0	0	31
ZIM HONG KONG	9HGP7	Houston	50	0	3	54	0	0	0	0	0	0	0	0	107
ZIM ITALIA	4XGT	New Orleans	32	41	0	0	0	0	0	0	0	0	0	0	73
ZIM SAVANNAH	A8ER9	New York City	14	3	13	14	9	12	0	0	0	0	0	0	65
ZIM SHANGHAI	SVBC	New York City	0	8	15	15	5	8	0	0	0	0	0	0	51
ZUIDERDAM	PBIG	Anchorage	17	11	8	0	7	0	0	0	0	0	0	0	43

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TOTAL SHIPS: 672	16,557	15,141	15,918	17,691	19,500	18,636	0	0	0	0	0	0	103,443



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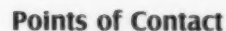
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